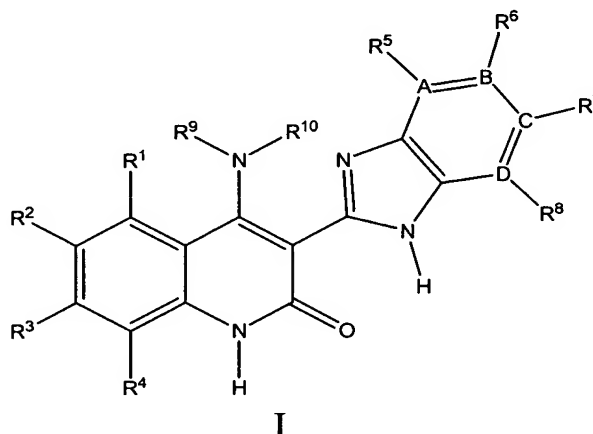


CLAIMS

What is claimed is:

1 1. A method of inhibiting a serine/threonine kinase in a
2 subject or treating a biological condition mediated by a serine/threonine
3 kinase in a subject, comprising: administering to the subject a compound of
4 Structure I, a tautomer of the compound, a pharmaceutically acceptable salt
5 of the compound, a pharmaceutically acceptable salt of the tautomer, or
6 mixtures thereof wherein Structure I has the following formula



wherein,

A, B, C, and D are independently selected from the group
consisting carbon and nitrogen;

R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
-CN, -NO₂, substituted and unsubstituted alkyl groups having
from 1 to 12 carbon atoms, substituted and unsubstituted
alkenyl groups having from 1 to 12 carbon atoms, substituted
and unsubstituted alkynyl groups having from 1 to 8 carbon
atoms, substituted and unsubstituted heterocyclyl groups,
substituted and unsubstituted heterocyclylalkyl groups, -SH,

18 substituted and unsubstituted -S-alkyl groups, substituted and
19 unsubstituted -S(=O)₂-O-alkyl groups, substituted and
20 unsubstituted -S(=O)₂-alkyl groups, substituted and
21 unsubstituted -S(=O)-alkyl groups, -S(=O)-NH₂, substituted and
22 unsubstituted -S(=O)-N(H)(alkyl) groups, substituted and
23 unsubstituted -S(=O)-N(alkyl)₂ groups, -OH, substituted and
24 unsubstituted alkoxy groups, substituted and unsubstituted
25 aryloxy groups, substituted and unsubstituted arylalkoxy groups,
26 substituted and unsubstituted heterocyclyloxy groups,
27 substituted and unsubstituted heterocyclylalkoxy groups, -NH₂,
28 substituted and unsubstituted -N(H)(alkyl) groups, substituted
29 and unsubstituted -N(alkyl)₂ groups, substituted and
30 unsubstituted -N(H)(heterocyclyl) groups, substituted and
31 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
32 unsubstituted -N(heterocyclyl)₂ groups, substituted and
33 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
34 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
35 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
36 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
37 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
38 unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups, substituted
39 and unsubstituted -N(H)-S(=O)-alkyl groups, substituted and
40 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
41 -C(=O)-heterocyclyl groups, substituted and unsubstituted
42 -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and
43 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
44 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
45 unsubstituted -C(=O)-N(H)(aralkyl) groups, substituted and
46 unsubstituted -C(=O)-N(H)(heterocyclyl) groups,
47 -C(=O)-N(H)(heterocyclylalkyl) groups, -CO₂H, substituted and
48 unsubstituted -C(=O)-O-alkyl groups, substituted and

49 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted
50 and unsubstituted -C(=O)-O-heterocyclylalkyl groups;

51 R^2 and R^3 are independently selected from the group consisting
52 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
53 alkyl groups having from 1 to 12 carbon atoms, substituted and
54 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
55 substituted and unsubstituted alkynyl groups having from 1 to 8
56 carbon atoms, substituted and unsubstituted aryl groups,
57 substituted and unsubstituted aralkyl groups, substituted and
58 unsubstituted heterocyclyl groups, substituted and unsubstituted
59 heterocyclylalkyl groups, -SH, substituted and unsubstituted -S-
60 alkyl groups, substituted and unsubstituted -S-aryl groups,
61 substituted and unsubstituted -S-aralkyl groups, substituted and
62 unsubstituted -S(=O)₂-O-alkyl groups, substituted and
63 unsubstituted -S(=O)₂-alkyl groups, substituted and
64 unsubstituted -S(=O)₂-heterocyclyl groups, substituted and
65 unsubstituted -S(=O)-alkyl groups, substituted and unsubstituted
66 -S(=O)-heterocyclyl groups, -S(=O)₂-NH₂, substituted and
67 unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
68 unsubstituted -S(=O)₂-N(alkyl)₂ groups, substituted and
69 unsubstituted -S(=O)₂-N(H)(aryl) groups, substituted and
70 unsubstituted -S(=O)₂-N(alkyl)(aryl) groups, substituted and
71 unsubstituted -S(=O)₂-N(aryl)₂ groups, substituted and
72 unsubstituted -S(=O)₂-N(H)(aralkyl) groups, substituted and
73 unsubstituted -S(=O)₂-N(alkyl)(aralkyl) groups, substituted and
74 unsubstituted -S(=O)₂-N(aralkyl)₂ groups, -OH, substituted and
75 unsubstituted alkoxy groups, substituted and unsubstituted
76 aryloxy groups, substituted and unsubstituted arylalkoxy groups,
77 substituted and unsubstituted heterocyclyloxy groups,
78 substituted and unsubstituted heterocyclylalkoxy groups, -NH₂,
79 substituted and unsubstituted -N(H)(alkyl) groups, substituted

80 and unsubstituted -N(alkyl)₂ groups, substituted and
81 unsubstituted -N(H)(aryl) groups, substituted and unsubstituted
82 -N(alkyl)(aryl) groups, substituted and unsubstituted -N(aryl)₂
83 groups, substituted and unsubstituted -N(H)(aralkyl) groups,
84 substituted and unsubstituted -N(alkyl)(aralkyl) groups,
85 substituted and unsubstituted -N(aralkyl)₂ groups, substituted
86 and unsubstituted -N(H)(heterocyclyl) groups, substituted and
87 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
88 unsubstituted -N(heterocyclyl)₂ groups, substituted and
89 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
90 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
91 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
92 unsubstituted -N(H)-S(=O)₂-alkyl groups, substituted and
93 unsubstituted -N(H)-S(=O)₂-aryl groups, substituted and
94 unsubstituted -N(H)-S(=O)₂-aralkyl groups, substituted and
95 unsubstituted -N(H)-S(=O)₂-heterocyclyl groups, substituted and
96 unsubstituted -N(H)-S(=O)₂-heterocyclylalkyl groups, substituted
97 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
98 unsubstituted -N(H)-C(=O)-aryl groups, substituted and
99 unsubstituted -N(H)-C(=O)-aralkyl groups, substituted and
100 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
101 unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups, substituted
102 and unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
103 unsubstituted -N(alkyl)-C(=O)-aryl groups, substituted and
104 unsubstituted -N(alkyl)-C(=O)-aralkyl groups, substituted and
105 unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted
106 and unsubstituted -N(alkyl)-C(=O)-heterocyclylalkyl groups,
107 substituted and unsubstituted -N(alkyl)-S(=O)₂-alkyl groups,
108 substituted and unsubstituted -N(alkyl)-S(=O)₂-aryl groups,
109 substituted and unsubstituted -N(alkyl)-S(=O)₂-aralkyl groups,
110 substituted and unsubstituted -N(alkyl)-S(=O)₂-heterocyclyl
111 groups, substituted and unsubstituted

112 -N(alkyl)-S(=O)₂-heterocyclalkyl groups, -N(H)-C(=O)-NH₂,
113 substituted and unsubstituted -N(H)-C(=O)-N(H)(alkyl) groups,
114 substituted and unsubstituted -N(H)-C(=O)-N(alkyl)₂ groups,
115 substituted and unsubstituted -N(H)-C(=O)-N(H)(aryl) groups,
116 substituted and unsubstituted -N(H)-C(=O)-N(alkyl)(aryl) groups,
117 substituted and unsubstituted -N(H)-C(=O)-N(aryl)₂ groups,
118 substituted and unsubstituted -N(H)-C(=O)-N(H)(aralkyl) groups,
119 substituted and unsubstituted -N(H)-C(=O)-N(alkyl)(aralkyl)
120 groups, substituted and unsubstituted -N(H)-C(=O)-N(aralkyl)₂
121 groups, substituted and unsubstituted
122 -N(H)-C(=O)-N(H)(heterocyclyl) groups, substituted and
123 unsubstituted -N(H)-C(=O)-N(alkyl)(heterocyclyl) groups,
124 substituted and unsubstituted -N(H)-C(=O)-N(heterocyclyl)₂
125 groups, substituted and unsubstituted
126 -N(H)-C(=O)-N(H)(heterocyclalkyl) groups, substituted and
127 unsubstituted -N(H)-C(=O)-N(alkyl)(heterocyclalkyl) groups,
128 substituted and unsubstituted -N(H)-C(=O)-N(heterocyclalkyl)₂
129 groups, substituted and unsubstituted -N(alkyl)-C(=O)-NH₂
130 groups, substituted and unsubstituted
131 -N(alkyl)-C(=O)-N(H)(alkyl) groups, substituted and
132 unsubstituted -N(alkyl)-C(=O)-N(alkyl)₂ groups, substituted and
133 unsubstituted -N(alkyl)-C(=O)-N(H)(aryl) groups, substituted and
134 unsubstituted -N(alkyl)-C(=O)-N(alkyl)(aryl) groups, substituted
135 and unsubstituted -N(alkyl)-C(=O)-N(aryl)₂ groups, substituted
136 and unsubstituted -N(alkyl)-C(=O)-N(H)(aralkyl) groups,
137 substituted and unsubstituted -N(alkyl)-C(=O)-N(alkyl)(aralkyl)
138 groups, substituted and unsubstituted
139 -N(alkyl)-C(=O)-N(aralkyl)₂ groups, substituted and
140 unsubstituted -N(alkyl)-C(=O)-N(H)(heterocyclyl) groups,
141 substituted and unsubstituted
142 -N(alkyl)-C(=O)-N(alkyl)(heterocyclyl) groups, substituted and
143 unsubstituted -N(alkyl)-C(=O)-N(heterocyclyl)₂ groups,

- 144 substituted and unsubstituted
- 145 -N(alkyl)-C(=O)-N(H)(heterocyclalkyl) groups, substituted and
- 146 unsubstituted -N(alkyl)-C(=O)-N(alkyl)(heterocyclalkyl) groups,
- 147 substituted and unsubstituted
- 148 -N(alkyl)-C(=O)-N(heterocyclalkyl)₂ groups, substituted and
- 149 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
- 150 -C(=O)-aryl groups, substituted and unsubstituted -C(=O)-aralkyl
- 151 groups, substituted and unsubstituted -C(=O)-heterocycl
- 152 groups, substituted and unsubstituted -C(=O)-heterocyclalkyl
- 153 groups, -C(=O)-NH₂, substituted and unsubstituted
- 154 -C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
- 155 -C(=O)-N(alkyl)₂ groups, substituted and unsubstituted
- 156 -C(=O)-N(H)(aryl) groups, substituted and unsubstituted
- 157 -C(=O)-N(alkyl)(aryl) groups, substituted and unsubstituted
- 158 -C(=O)-N(aryl)₂ groups, substituted and unsubstituted
- 159 -C(=O)-N(H)(aralkyl) groups, substituted and unsubstituted
- 160 -C(=O)-N(alkyl)(aralkyl) groups, substituted and unsubstituted
- 161 -C(=O)-N(aralkyl)₂ groups, substituted and unsubstituted
- 162 -C(=O)-N(H)(heterocycl) groups, substituted and unsubstituted
- 163 -C(=O)-N(alkyl)(heterocycl) groups, substituted and
- 164 unsubstituted -C(=O)-N(heterocycl)₂ groups, substituted and
- 165 unsubstituted -C(=O)-N(H)(heterocyclalkyl) groups, substituted
- 166 and unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl) groups,
- 167 substituted and unsubstituted -C(=O)-N(heterocyclalkyl)₂
- 168 groups, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl
- 169 groups, substituted and unsubstituted -C(=O)-O-aryl groups,
- 170 substituted and unsubstituted -C(=O)-O-heterocycl groups,
- 171 and substituted and unsubstituted -C(=O)-O-heterocyclalkyl
- 172 groups;
- 173 R⁴ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
- 174 -CN, -NO₂, substituted and unsubstituted alkyl groups having

175 from 1 to 12 carbon atoms, substituted and unsubstituted
176 alkenyl groups having from 1 to 8 carbon atoms, substituted and
177 unsubstituted alkynyl groups having from 1 to 8 carbon atoms,
178 -SH, substituted and unsubstituted -S-alkyl groups, substituted
179 and unsubstituted -S(=O)₂-O-alkyl groups, substituted and
180 unsubstituted -S(=O)₂-alkyl groups, substituted and
181 unsubstituted -S(=O)-alkyl groups, -S(=O)₂-NH₂, substituted and
182 unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
183 unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and
184 unsubstituted alkoxy groups, -NH₂, substituted and
185 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
186 -N(alkyl)₂ groups, substituted and unsubstituted
187 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
188 -N(H)-S(=O)-alkyl groups, -C(=O)-NH₂, substituted and
189 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
190 unsubstituted -C(=O)-N(alkyl)₂ groups, and substituted and
191 unsubstituted -C(=O)-O-alkyl groups;

192 R⁵ and R⁸ are independently selected from the group consisting
193 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
194 straight and branched chain alkyl groups having from 1 to 8
195 carbon atoms, substituted and unsubstituted alkenyl groups
196 having from 1 to 8 carbon atoms, substituted and unsubstituted
197 alkynyl groups having from 1 to 8 carbon atoms, substituted and
198 unsubstituted heterocyclyl groups, -SH, substituted and
199 unsubstituted -S-alkyl groups, substituted and unsubstituted
200 -S(=O)₂-O-alkyl groups, substituted and unsubstituted
201 -S(=O)₂-alkyl groups, substituted and unsubstituted -S(=O)-alkyl
202 groups, -S(=O)₂-NH₂, substituted and unsubstituted
203 -S(=O)₂-N(H)(alkyl) groups, substituted and unsubstituted
204 -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and unsubstituted
205 alkoxy groups, -NH₂, substituted and unsubstituted -N(H)(alkyl)

206 groups, substituted and unsubstituted $-N(\text{alkyl})_2$ groups,
207 substituted and unsubstituted $-N(\text{H})-\text{C}(=\text{O})$ -alkyl groups,
208 substituted and unsubstituted $-N(\text{H})-\text{S}(=\text{O})$ -alkyl groups,
209 $-\text{C}(=\text{O})-\text{NH}_2$, substituted and unsubstituted $-\text{C}(=\text{O})-\text{N}(\text{H})(\text{alkyl})$
210 groups, substituted and unsubstituted $-\text{C}(=\text{O})-\text{N}(\text{alkyl})_2$ groups,
211 and substituted and unsubstituted $-\text{C}(=\text{O})-\text{O}$ -alkyl groups; or R^5
212 may be absent if A is nitrogen; or R^8 may be absent if D is
213 nitrogen;

214 R^6 and R^7 are independently selected from the group consisting
215 of $-\text{H}$, $-\text{F}$, $-\text{Cl}$, $-\text{Br}$, $-\text{I}$, $-\text{NO}_2$, $-\text{CN}$, substituted and unsubstituted
216 alkyl groups having from 1 to 12 carbon atoms, substituted and
217 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
218 substituted and unsubstituted alkynyl groups having from 1 to 8
219 carbon atoms, substituted and unsubstituted heterocyclyl
220 groups, substituted and unsubstituted heterocyclylalkyl groups,
221 $-\text{SH}$, substituted and unsubstituted $-\text{S}$ -alkyl groups, substituted
222 and unsubstituted $-\text{S}(=\text{O})_2-\text{O}$ -alkyl groups, substituted and
223 unsubstituted $-\text{S}(=\text{O})_2$ -alkyl groups, substituted and
224 unsubstituted $-\text{S}(=\text{O})_2$ -heterocyclyl groups, substituted and
225 unsubstituted $-\text{S}(=\text{O})$ -alkyl groups, substituted and unsubstituted
226 $-\text{S}(=\text{O})$ -heterocyclyl groups, $-\text{S}(=\text{O})_2-\text{NH}_2$, substituted and
227 unsubstituted $-\text{S}(=\text{O})_2-\text{N}(\text{H})(\text{alkyl})$ groups, substituted and
228 unsubstituted $-\text{S}(=\text{O})_2-\text{N}(\text{alkyl})_2$ groups, substituted and
229 unsubstituted $-\text{S}(=\text{O})_2-\text{N}(\text{H})(\text{heterocyclyl})$ groups, substituted
230 and unsubstituted $-\text{S}(=\text{O})_2-\text{N}(\text{alkyl})(\text{heterocyclyl})$ groups,
231 substituted and unsubstituted $-\text{S}(=\text{O})_2-\text{N}(\text{heterocyclyl})_2$ groups,
232 substituted and unsubstituted $-\text{S}(=\text{O})_2-\text{N}(\text{H})(\text{heterocyclylalkyl})$
233 groups, substituted and unsubstituted
234 $-\text{S}(=\text{O})_2-\text{N}(\text{alkyl})(\text{heterocyclylalkyl})$ groups, substituted and
235 unsubstituted $-\text{S}(=\text{O})_2-\text{N}(\text{heterocyclylalkyl})_2$ groups, $-\text{OH}$,
236 substituted and unsubstituted alkoxy groups, substituted and

237 unsubstituted aryloxy groups, substituted and unsubstituted
238 arylalkoxy groups, substituted and unsubstituted heterocyclyloxy
239 groups, substituted and unsubstituted heterocyclylalkoxy
240 groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups,
241 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
242 unsubstituted -N(H)(aryl) groups, substituted and unsubstituted
243 -N(alkyl)(aryl) groups, substituted and unsubstituted -N(aryl)₂
244 groups, substituted and unsubstituted -N(H)(aralkyl) groups,
245 substituted and unsubstituted -N(alkyl)(aralkyl) groups,
246 substituted and unsubstituted -N(aralkyl)₂ groups, substituted
247 and unsubstituted -N(H)(heterocyclyl) groups, substituted and
248 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
249 unsubstituted -N(heterocyclyl)₂ groups, substituted and
250 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
251 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
252 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
253 unsubstituted -N(H)-S(=O)₂-alkyl groups, substituted and
254 unsubstituted -N(H)-S(=O)₂-heterocyclyl groups, substituted and
255 unsubstituted -N(H)-S(=O)₂-heterocyclylalkyl groups, substituted
256 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
257 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
258 unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups, substituted
259 and unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
260 unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted
261 and unsubstituted -N(alkyl)-C(=O)-heterocyclylalkyl groups,
262 substituted and unsubstituted -N(alkyl)-S(=O)₂-alkyl groups,
263 substituted and unsubstituted -N(alkyl)-S(=O)₂-heterocyclyl
264 groups, substituted and unsubstituted
265 -N(alkyl)-S(=O)₂-heterocyclylalkyl groups, substituted and
266 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
267 -C(=O)-heterocyclyl groups, substituted and unsubstituted
268 -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and

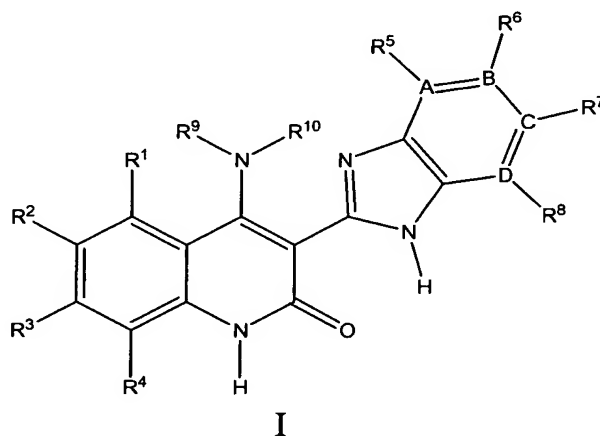
269 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
270 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
271 unsubstituted -C(=O)-N(H)(aryl) groups, substituted and
272 unsubstituted -C(=O)-N(alkyl)(aryl) groups, substituted and
273 unsubstituted -C(=O)-N(aryl)₂ groups, substituted and
274 unsubstituted -C(=O)-N(H)(aralkyl) groups, substituted and
275 unsubstituted -C(=O)-N(alkyl)(aralkyl) groups, substituted and
276 unsubstituted -C(=O)-N(aralkyl)₂ groups, substituted and
277 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
278 unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted
279 and unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted
280 and unsubstituted -C(=O)-N(H)(heterocyclalkyl) groups,
281 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl)
282 groups, substituted and unsubstituted
283 -C(=O)-N(heterocyclalkyl)₂ groups, -CO₂H, substituted and
284 unsubstituted -C(=O)-O-alkyl groups, substituted and
285 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted
286 and unsubstituted -C(=O)-O-heterocyclalkyl groups; or R⁶ may
287 be absent if B is nitrogen; or R⁷ may be absent if C is nitrogen;

288 R⁹ is selected from the group consisting of -H, substituted and
289 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
290 substituted and unsubstituted aryl groups, substituted and
291 unsubstituted aralkyl groups, substituted and unsubstituted
292 heterocyclyl groups, substituted and unsubstituted
293 heterocyclalkyl groups, substituted and unsubstituted
294 heterocyclaminoalkyl groups, substituted and unsubstituted
295 alkoxy groups, and -NH₂, or R⁹ and R¹⁰ join together to form one
296 or more rings, each having 5, 6, or 7 ring members; and

297 R¹⁰ is -H, or R⁹ and R¹⁰ join together to form one or more rings,
298 each having 5, 6, or 7 ring members.

2. The method of claim 1, wherein the serine/threonine kinase is glycogen synthase kinase 3, cyclin dependent kinase 2, cyclin dependent kinase 4, checkpoint kinase 1, NEK-2, CHK2, MEK1, CK1 ϵ , Raf, ribosomal S6 kinase 2, or PAR-1.

3. A method of inhibiting a serine/threonine kinase in a subject or treating a biological condition mediated by a serine/threonine kinase in a subject, comprising: administering to the subject a compound of Structure I, a tautomer of the compound, a pharmaceutically acceptable salt of the compound, a pharmaceutically acceptable salt of the tautomer, or mixtures thereof wherein Structure I has the following formula and the serine/threonine kinase is glycogen synthase kinase 3



wherein,

A, B, C, and D are independently selected from the group consisting of carbon and nitrogen;

R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted straight and branched chain alkyl groups having from 1 to 8 carbon atoms, substituted and unsubstituted alkenyl groups having from 1 to 8 carbon atoms, substituted and unsubstituted alkynyl groups having from 1 to 8 carbon atoms, substituted and unsubstituted heterocyclyl

18 groups, -SH, substituted and unsubstituted -S-alkyl groups,
19 substituted and unsubstituted -S(=O)₂-O-alkyl groups,
20 substituted and unsubstituted -S(=O)₂-alkyl groups, substituted
21 and unsubstituted -S(=O)-alkyl groups, -S(=O)-NH₂, substituted
22 and unsubstituted -S(=O)-N(H)(alkyl) groups, substituted and
23 unsubstituted -S(=O)-N(alkyl)₂ groups, -OH, substituted and
24 unsubstituted alkoxy groups, substituted and unsubstituted
25 heterocyclyloxy groups, substituted and unsubstituted
26 heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted
27 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
28 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
29 substituted and unsubstituted -N(H)-S(=O)-alkyl groups,
30 -C(=O)-NH₂, substituted and unsubstituted -C(=O)-N(H)(alkyl)
31 groups, substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
32 substituted and unsubstituted -C(=O)-N(H)(aralkyl) groups,
33 -CO₂H, and substituted and unsubstituted -C(=O)-O-alkyl
34 groups;

35 R² is selected from the group consisting of -H, -F, -Cl, -Br, -I,
36 -CN, -NO₂, substituted and unsubstituted straight and branched
37 chain alkyl groups having from 1 to 8 carbon atoms, substituted
38 and unsubstituted alkenyl groups having from 1 to 8 carbon
39 atoms, substituted and unsubstituted alkynyl groups having from
40 1 to 8 carbon atoms, substituted and unsubstituted cycloalkyl
41 groups, substituted and unsubstituted cycloalkenyl groups,
42 substituted and unsubstituted aryl groups, substituted and
43 unsubstituted heterocyclyl groups, -SH, substituted and
44 unsubstituted -S-alkyl groups, substituted and unsubstituted
45 -S(=O)₂-O-alkyl groups, substituted and unsubstituted
46 -S(=O)₂-alkyl groups, substituted and unsubstituted
47 -S(=O)₂-heterocyclyl groups, substituted and unsubstituted
48 -S(=O)-alkyl groups, substituted and unsubstituted

49 -S(=O)-heterocyclyl groups, -S(=O)₂-NH₂, substituted and
50 unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
51 unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and
52 unsubstituted alkoxy groups, substituted and unsubstituted
53 heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted
54 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
55 groups, substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
56 substituted and unsubstituted -N(H)-C(=O)-heterocyclyl groups,
57 substituted and unsubstituted -N(H)-S(=O)-alkyl groups,
58 substituted and unsubstituted -N(H)-S(=O)-heterocyclyl groups,
59 -N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
60 -N(alkyl)-C(=O)-heterocyclyl groups, substituted and
61 unsubstituted -N(alkyl)-S(=O)-alkyl groups, substituted and
62 unsubstituted -N(alkyl)-S(=O)-heterocyclyl groups,
63 -N(H)-C(=O)-NH₂, substituted and unsubstituted
64 -N(H)-C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
65 -N(H)-C(=O)-N(alkyl)₂ groups, -N(alkyl)-C(=O)-NH₂, substituted
66 and unsubstituted -N(alkyl)-C(=O)-N(H)(alkyl) groups,
67 substituted and unsubstituted -N(alkyl)-C(=O)-N(alkyl)₂ groups,
68 -C(=O)-NH₂, substituted and unsubstituted -C(=O)-N(H)(alkyl)
69 groups, substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
70 substituted and unsubstituted -C(=O)-alkyl groups, substituted
71 and unsubstituted -C(=O)-heterocyclyl groups, -CO₂H, and
72 substituted and unsubstituted -C(=O)-O-alkyl groups; or R² and
73 R³ may join together to form a cyclic group;

74 R³ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
75 -CN, -NO₂, substituted and unsubstituted straight and branched
76 chain alkyl groups having from 1 to 8 carbon atoms, substituted
77 and unsubstituted alkenyl groups having from 1 to 8 carbon
78 atoms, substituted and unsubstituted alkynyl groups having from
79 1 to 8 carbon atoms, substituted and unsubstituted aryl groups,

80 substituted and unsubstituted aralkyl groups, substituted and
81 unsubstituted heterocyclyl groups, substituted and unsubstituted
82 heterocyclylalkyl groups, -SH, substituted and unsubstituted -S-
83 alkyl groups, substituted and unsubstituted -S(=O)₂-O-alkyl
84 groups, substituted and unsubstituted -S(=O)₂-alkyl groups,
85 substituted and unsubstituted -S(=O)₂-heterocyclyl groups,
86 substituted and unsubstituted -S(=O)-alkyl groups, substituted
87 and unsubstituted -S(=O)-heterocyclyl groups, -S(=O)-NH₂,
88 substituted and unsubstituted -S(=O)-N(H)(alkyl) groups,
89 substituted and unsubstituted -S(=O)-N(alkyl)₂ groups, -OH,
90 substituted and unsubstituted alkoxy groups, substituted and
91 unsubstituted heterocyclyoxy groups, substituted and
92 unsubstituted heterocyclylalkoxy groups, substituted and
93 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
94 -N(H)(cycloalkyl) groups, substituted and unsubstituted
95 -N(H)(heterocyclyl) groups, substituted and unsubstituted
96 -N(H)(heterocyclylalkyl) groups, substituted and unsubstituted
97 -N(alkyl)₂ groups, -NH₂, substituted and unsubstituted
98 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
99 -N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
100 -N(H)-S(=O)-alkyl groups, substituted and unsubstituted
101 -N(H)-S(=O)-heterocyclyl groups, substituted and unsubstituted
102 -N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
103 -N(alkyl)-C(=O)-heterocyclyl groups, substituted and
104 unsubstituted -N(alkyl)-S(=O)-alkyl groups, substituted and
105 unsubstituted -N(alkyl)-S(=O)-heterocyclyl groups,
106 -N(H)-C(=O)-NH₂, substituted and unsubstituted
107 -N(H)-C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
108 -N(H)-C(=O)-N(alkyl)₂ groups, -N(alkyl)-C(=O)-NH₂, substituted
109 and unsubstituted -N(alkyl)-C(=O)-N(H)(alkyl) groups substituted
110 and unsubstituted -N(alkyl)-C(=O)-N(alkyl)₂ groups, substituted
111 and unsubstituted -C(=O)-alkyl groups, substituted and

112 unsubstituted -C(=O)-heterocyclyl groups, -C(=O)-NH₂ groups,
113 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
114 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
115 substituted and unsubstituted -C(=O)-N(H)(heterocyclyl) groups,
116 substituted and unsubstituted -C(=O)-N(H)(aryl) groups, -CO₂H,
117 and substituted and unsubstituted -C(=O)-O-alkyl groups, or R²
118 and R³ may join together to form a cyclic group;

119 R⁴ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
120 -CN, -NO₂, substituted and unsubstituted straight and branched
121 chain alkyl groups having from 1 to 8 carbon atoms, substituted
122 and unsubstituted alkenyl groups having from 1 to 8 carbon
123 atoms, substituted and unsubstituted alkynyl groups having from
124 1 to 8 carbon atoms, -SH, substituted and unsubstituted -S-alkyl
125 groups, substituted and unsubstituted -S(=O)₂-O-alkyl groups,
126 substituted and unsubstituted -S(=O)₂-alkyl groups, substituted
127 and unsubstituted -S(=O)-alkyl groups, -S(=O)₂-NH₂, substituted
128 and unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
129 unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and
130 unsubstituted alkoxy groups, -NH₂, substituted and
131 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
132 -N(alkyl)₂ groups, substituted and unsubstituted
133 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
134 -N(H)-S(=O)-alkyl groups, -C(=O)-NH₂, substituted and
135 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
136 unsubstituted -C(=O)-N(alkyl)₂ groups, and substituted and
137 unsubstituted -C(=O)-O-alkyl groups;

138 R⁵ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
139 -CN, -NO₂, substituted and unsubstituted straight and branched
140 chain alkyl groups having from 1 to 8 carbon atoms, substituted
141 and unsubstituted alkenyl groups having from 1 to 8 carbon
142 atoms, substituted and unsubstituted alkynyl groups having from

143 1 to 8 carbon atoms, substituted and unsubstituted heterocyclyl
144 groups, -SH, substituted and unsubstituted -S-alkyl groups,
145 substituted and unsubstituted -S(=O)₂-O-alkyl groups,
146 substituted and unsubstituted -S(=O)₂-alkyl groups, substituted
147 and unsubstituted -S(=O)-alkyl groups, -S(=O)₂-NH₂, substituted
148 and unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
149 unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and
150 unsubstituted alkoxy groups, -NH₂, substituted and
151 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
152 -N(alkyl)₂ groups, substituted and unsubstituted
153 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
154 -N(H)-S(=O)-alkyl groups, -C(=O)-NH₂, substituted and
155 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
156 unsubstituted -C(=O)-N(alkyl)₂ groups, and substituted and
157 unsubstituted -C(=O)-O-alkyl groups; or R⁵ may be absent if A is
158 nitrogen;

159 R⁶ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
160 -CN, -NO₂, substituted and unsubstituted alkyl groups having
161 from 1 to 8 carbon atoms, substituted and unsubstituted alkenyl
162 groups having from 1 to 8 carbon atoms, substituted and
163 unsubstituted alkynyl groups having from 1 to 8 carbon atoms,
164 substituted and unsubstituted heterocyclyl groups, -SH,
165 substituted and unsubstituted -S-alkyl groups, substituted and
166 unsubstituted -S(=O)₂-O-alkyl groups, substituted and
167 unsubstituted -S(=O)₂-alkyl groups, substituted and
168 unsubstituted -S(=O)₂-heterocyclyl groups, substituted and
169 unsubstituted -S(=O)-alkyl groups, substituted and unsubstituted
170 -S(=O)-heterocyclyl groups, -S(=O)₂-NH₂, substituted and
171 unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
172 unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and
173 unsubstituted alkoxy groups, -NH₂, substituted and

- 174 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
175 -N(alkyl)₂ groups, substituted and unsubstituted
176 -N(H)(heterocyclyl) groups, substituted and unsubstituted
177 -N(alkyl)(heterocyclyl) groups, substituted and unsubstituted
178 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
179 -N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
180 -N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
181 -N(alkyl)-C(=O)-heterocyclyl groups, substituted and
182 unsubstituted -N(H)-S(=O)₂-alkyl groups, substituted and
183 unsubstituted -N(H)-S(=O)₂-heterocyclyl groups, substituted and
184 unsubstituted -N(alkyl)-S(=O)₂-alkyl groups, substituted and
185 unsubstituted -N(alkyl)-S(=O)₂-heterocyclyl groups, substituted
186 and unsubstituted -C(=O)-alkyl groups, substituted and
187 unsubstituted -C(=O)-heterocyclyl groups, -C(=O)-NH₂,
188 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
189 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups, -CO₂H,
190 and substituted and unsubstituted -C(=O)-O-alkyl groups; or R⁶
191 may be absent if B is nitrogen;
- 192 R⁷ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
193 -CN, -NO₂, substituted and unsubstituted alkyl groups having
194 from 1 to 8 carbon atoms, substituted and unsubstituted alkenyl
195 groups having from 1 to 8 carbon atoms, substituted and
196 unsubstituted alkynyl groups having from 1 to 8 carbon atoms,
197 substituted and unsubstituted heterocyclyl groups, substituted
198 and unsubstituted heterocyclylalkyl groups, -SH, substituted and
199 unsubstituted -S-alkyl groups, substituted and unsubstituted
200 -S(=O)₂-O-alkyl groups, substituted and unsubstituted
201 -S(=O)₂-alkyl groups, substituted and unsubstituted
202 -S(=O)₂-heterocyclyl groups, substituted and unsubstituted
203 -S(=O)-alkyl groups, substituted and unsubstituted
204 -S(=O)-heterocyclyl groups, -S(=O)₂-NH₂, substituted and

205 unsubstituted $-S(=O)_2-N(H)(alkyl)$ groups, substituted and
206 unsubstituted $-S(=O)_2-N(alkyl)_2$ groups, $-OH$, substituted and
207 unsubstituted alkoxy groups, $-NH_2$, substituted and
208 unsubstituted $-N(H)(alkyl)$ groups, substituted and unsubstituted
209 $-N(alkyl)_2$ groups, substituted and unsubstituted
210 $-N(H)(heterocyclyl)$ groups, substituted and unsubstituted
211 $-N(alkyl)(heterocyclyl)$ groups, substituted and unsubstituted
212 $-N(H)-C(=O)-alkyl$ groups, substituted and unsubstituted
213 $-N(H)-C(=O)-heterocyclyl$ groups, substituted and unsubstituted
214 $-N(alkyl)-C(=O)-alkyl$ groups, substituted and unsubstituted
215 $-N(alkyl)-C(=O)-heterocyclyl$ groups, substituted and
216 unsubstituted $-N(H)-S(=O)-alkyl$ groups, substituted and
217 unsubstituted $-N(H)-S(=O)-heterocyclyl$ groups, substituted and
218 unsubstituted $-N(alkyl)-S(=O)-alkyl$ groups, substituted and
219 unsubstituted $-N(alkyl)-S(=O)-heterocyclyl$ groups, substituted
220 and unsubstituted amidine groups, $-C(=O)-NH_2$, substituted and
221 unsubstituted $-C(=O)-N(H)(alkyl)$ groups, substituted and
222 unsubstituted $-C(=O)-N(alkyl)_2$ groups, substituted and
223 unsubstituted $-C(=O)-N(H)(heterocyclyl)$ groups, substituted and
224 unsubstituted $-C(=O)-N(H)(alkyl)(heterocyclyl)$ groups,
225 substituted and unsubstituted $-C(=O)-N(heterocyclyl)_2$ groups,
226 substituted and unsubstituted $-C(=O)-alkyl$ groups, substituted
227 and unsubstituted $-C(=O)-heterocyclyl$ groups, $-CO_2H$, and
228 substituted and unsubstituted $-C(=O)-O-alkyl$ groups; or R^7 may
229 be absent if C is nitrogen;

230 R^8 is selected from the group consisting of $-H$, $-F$, $-Cl$, $-Br$, $-I$,
231 $-CN$, $-NO_2$, substituted and unsubstituted straight and branched
232 chain alkyl groups having from 1 to 8 carbon atoms, substituted
233 and unsubstituted alkenyl groups having from 1 to 8 carbon
234 atoms, substituted and unsubstituted alkynyl groups having from
235 1 to 8 carbon atoms, substituted and unsubstituted heterocyclyl

236 groups, -SH, substituted and unsubstituted -S-alkyl groups,
237 substituted and unsubstituted -S(=O)₂-O-alkyl groups,
238 substituted and unsubstituted -S(=O)₂-alkyl groups, substituted
239 and unsubstituted -S(=O)-alkyl groups, -S(=O)₂-NH₂, substituted
240 and unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
241 unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and
242 unsubstituted alkoxy groups, -NH₂, substituted and
243 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
244 -N(alkyl)₂ groups, substituted and unsubstituted
245 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
246 -N(H)-S(=O)₂-alkyl groups, -C(=O)-NH₂, substituted and
247 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
248 unsubstituted -C(=O)-N(alkyl)₂ groups, and substituted and
249 unsubstituted -C(=O)-O-alkyl groups; or R⁸ may be absent if D is
250 nitrogen;

251 R⁹ is selected from the group consisting of -H, substituted and
252 unsubstituted straight and branched chain alkyl groups having
253 from 1 to 8 carbon atoms, substituted and unsubstituted
254 cycloalkyl groups, substituted and unsubstituted aryl groups,
255 substituted and unsubstituted aralkyl groups, substituted and
256 unsubstituted heterocyclyl groups, substituted and unsubstituted
257 heterocyclylalkyl groups, substituted and unsubstituted
258 heterocyclylaminoalkyl groups, substituted and unsubstituted
259 alkoxy groups, and -NH₂, or R⁹ and R¹⁰ join together to form a
260 ring having 5, 6, or 7 ring members; and

261 R¹⁰ is -H, or R⁹ and R¹⁰ join together to form a ring having 5, 6,
262 or 7 ring members.

1

4. The method of claim 3, wherein

2 R^1 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
3 and straight and branched chain alkyl groups having from 1 to 8
4 carbon atoms;

5 R^2 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
6 -CN, -CO₂H, -NO₂, straight and branched chain alkyl groups
7 having from 1 to 8 carbon atoms, substituted and unsubstituted
8 cycloalkyl groups, substituted and unsubstituted cycloalkenyl
9 groups, substituted and unsubstituted aryl groups, substituted
10 and unsubstituted heterocyclyl groups, -OH, substituted and
11 unsubstituted alkoxy groups, -NH₂, substituted and
12 unsubstituted -N(H)(alkyl) groups, and substituted and
13 unsubstituted -N(alkyl)₂ groups;

14 R^3 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
15 -CN, straight and branched chain alkyl groups having from 1 to 8
16 carbon atoms, substituted and unsubstituted aryl groups,
17 substituted and unsubstituted heterocyclyl groups, -OH,
18 substituted and unsubstituted alkoxy groups, substituted and
19 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
20 -N(H)(cycloalkyl) groups, substituted and unsubstituted
21 -N(H)(heterocyclyl) groups, substituted and unsubstituted
22 -N(H)(heterocyclylalkyl) groups, substituted and unsubstituted
23 -N(alkyl)₂ groups, -CO₂H, substituted and unsubstituted
24 -C(=O)-heterocyclyl groups, substituted and unsubstituted
25 -C(=O)-alkyl groups, substituted and unsubstituted -C(=O)-
26 N(H)(alkyl) groups, substituted and unsubstituted
27 -C(=O)-N(alkyl)₂ groups, -C(=O)-NH₂ groups, substituted and
28 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, and substituted
29 and unsubstituted -C(=O)-N(H)(aryl) groups;

30 R^4 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
31 and straight and branched chain alkyl groups having from 1 to 8
32 carbon atoms;

33 R^5 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
34 straight and branched chain alkyl groups having from 1 to 8
35 carbon atoms, and substituted and unsubstituted heterocyclyl
36 groups; or R^5 may be absent if A is nitrogen;

37 R^6 is selected from the group consisting of -H, -F, -Cl, -Br,
38 substituted and unsubstituted alkyl groups having from 1 to 8
39 carbon atoms, substituted and unsubstituted heterocyclyl
40 groups, -OH, substituted and unsubstituted alkoxy groups,
41 substituted and unsubstituted -N(H)(alkyl) groups, substituted
42 and unsubstituted -N(H)(heterocyclyl) groups, and substituted
43 and unsubstituted -N(alkyl)(heterocyclyl) groups; or R^6 may be
44 absent if B is nitrogen;

45 R^7 is selected from the group consisting of -H, -Cl, -F, -Br,
46 substituted and unsubstituted alkyl groups having from 1 to 8
47 carbon atoms, -OH, substituted and unsubstituted alkoxy
48 groups, substituted and unsubstituted heterocyclyl groups,
49 substituted and unsubstituted -N(H)(alkyl) groups, substituted
50 and unsubstituted -N(H)(heterocyclyl) groups, and substituted
51 and unsubstituted -N(alkyl)(heterocyclyl) groups; or R^7 may be
52 absent if C is nitrogen; and

53 R^8 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
54 straight and branched chain alkyl groups having from 1 to 8
55 carbon atoms, and substituted and unsubstituted heterocyclyl
56 groups; or R^8 may be absent if D is nitrogen.

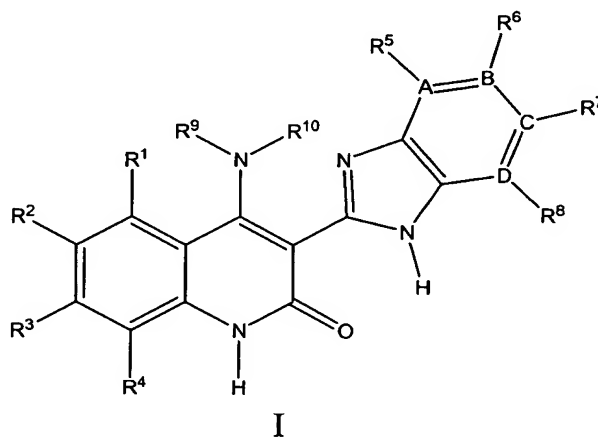
1 5. The method of claim 3, wherein R⁹ is selected from the
2 group consisting of substituted and unsubstituted straight and branched chain
3 alkyl groups having from 1 to 8 carbon atoms, substituted and unsubstituted
4 cycloalkyl groups, substituted and unsubstituted aryl groups, substituted and
5 unsubstituted aralkyl groups, substituted and unsubstituted heterocyclyl
6 groups, substituted and unsubstituted heterocyclylalkyl groups, substituted
7 and unsubstituted heterocyclylaminoalkyl groups, substituted and
8 unsubstituted alkoxy groups, and -NH₂.

1 6. The method of claim 3, wherein R² is selected from the
2 group consisting of -H, -Cl, -F, -Br, -I, -CH₃, -NO₂, -OMe, -CN, -CO₂H,
3 substituted and unsubstituted 1,2,3,6-tetrahydropyridine groups, substituted
4 and unsubstituted thiophene groups, substituted and unsubstituted imidazole
5 groups, substituted and unsubstituted pyrrole groups, substituted and
6 unsubstituted 3-pyridinyl groups, substituted and unsubstituted 4-pyridinyl
7 groups, phenyl, 2-substituted phenyl groups, 2,4-disubstituted phenyl groups,
8 4-substituted phenyl groups, 3-substituted phenyl groups, 2,6-disubstituted
9 phenyl groups, 3,4-disubstituted phenyl groups, substituted and unsubstituted
10 dialkylamino groups, and substituted and unsubstituted alkylamino groups.

1 7. The method of claim 3, wherein R³ is selected from the
2 group consisting of -H, -F, -Cl, -Br, -CH₃, -OH, -CN, substituted and
3 unsubstituted aryl groups, substituted and unsubstituted heterocyclyl groups,
4 substituted and unsubstituted alkoxy groups, substituted and unsubstituted
5 alkylamino groups, substituted and unsubstituted dialkylamino groups,
6 substituted and unsubstituted -C(=O)-heterocyclyl groups, substituted and
7 unsubstituted -C(=O)-N(alkyl)₂ groups, and -C(=O)-NH₂ groups.

1 8. A method of inhibiting a serine/threonine kinase in a
2 subject or treating a biological condition mediated by a serine/threonine
3 kinase in a subject, comprising: administering to the subject a compound of

4 Structure I, a tautomer of the compound, a pharmaceutically acceptable salt
5 of the compound, a pharmaceutically acceptable salt of the tautomer, or
6 mixtures thereof wherein Structure I has the following formula and the
7 serine/threonine kinase is cyclin dependent kinase 2



8

9

wherein,

10

A, B, C, and D are independently selected from the group
11 consisting of carbon and nitrogen;

11

12

R^1 , R^4 , R^5 , and R^8 are independently selected from the group
13 consisting of -H and substituted and unsubstituted straight and
14 branched chain alkyl groups having from 1 to 8 carbon atoms; or
15 R^5 may be absent if A is nitrogen; or R^8 may be absent if D is
16 nitrogen;

13

14

15

16

17

R^2 and R^3 are independently selected from the group consisting
18 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
19 alkyl groups having from 1 to 12 carbon atoms, substituted and
20 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
21 substituted and unsubstituted aryl groups, substituted and
22 unsubstituted aralkyl groups, substituted and unsubstituted
23 heterocyclyl groups, substituted and unsubstituted

18

19

20

21

22

23

24 heterocyclylalkyl groups, -NH₂, substituted and unsubstituted
25 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
26 groups, substituted and unsubstituted -N(H)(aryl) groups,
27 substituted and unsubstituted -N(alkyl)(aryl) groups, substituted
28 and unsubstituted -N(aryl)₂ groups, substituted and
29 unsubstituted -N(H)(heterocyclyl) groups, substituted and
30 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
31 unsubstituted -N(heterocyclyl)₂ groups;

32 R⁶ and R⁷ are independently selected from the group consisting
33 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
34 alkyl groups having from 1 to 12 carbon atoms, substituted and
35 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
36 substituted and unsubstituted heterocyclyl groups, substituted
37 and unsubstituted heterocyclylalkyl groups, -OH, substituted and
38 unsubstituted alkoxy groups, substituted and unsubstituted
39 heterocyclyloxy groups, substituted and unsubstituted
40 heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted
41 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
42 groups, substituted and unsubstituted -N(H)(heterocyclyl)
43 groups, substituted and unsubstituted -N(alkyl)(heterocyclyl)
44 groups, substituted and unsubstituted -N(heterocyclyl)₂ groups,
45 substituted and unsubstituted -N(H)(heterocyclylalkyl) groups,
46 substituted and unsubstituted -N(alkyl)(heterocyclylalkyl) groups,
47 substituted and unsubstituted -N(heterocyclylalkyl)₂ groups,
48 substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
49 substituted and unsubstituted -N(H)-C(=O)-heterocyclyl groups,
50 and substituted and unsubstituted -N(H)-C(=O)-heterocyclylalkyl
51 groups; or R⁶ may be absent if B is nitrogen; or R⁷ may be
52 absent if C is nitrogen;

53 R^9 is selected from the group consisting of -H, substituted and
54 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
55 substituted and unsubstituted alkenyl groups having from 1 to 12
56 carbon atoms, substituted and unsubstituted heterocyclyl
57 groups, substituted and unsubstituted heterocyclalkyl groups,
58 -OH, substituted and unsubstituted alkoxy groups, substituted
59 and unsubstituted heterocycloxy groups, substituted and
60 unsubstituted heterocyclalkoxy groups, substituted and
61 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
62 -C(=O)-heterocyclyl groups, and substituted and unsubstituted
63 -C(=O)-heterocyclalkyl groups;

64 R^{10} is -H.

1 9. The method of claim 8, wherein R^9 is selected from the
2 group consisting of -H, substituted and unsubstituted straight or branched
3 chain alkyl groups having from 1-8 carbon atoms, substituted and
4 unsubstituted saturated heterocyclyl groups, substituted and unsubstituted
5 heterocyclalkyl groups wherein the heterocyclyl moiety is saturated,
6 substituted and unsubstituted alkoxy groups, and substituted and
7 unsubstituted heterocyclalkoxy groups wherein the heterocyclyl moiety is
8 saturated.

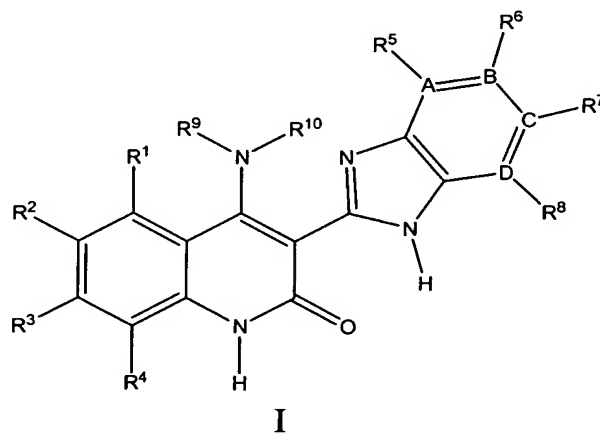
1 10. The method of claim 8, wherein R^2 is selected from the
2 group consisting of -H, -F, -Cl, -Br, -I, -NO₂, -CN, -NH₂, substituted and
3 unsubstituted straight or branched chain alkyl groups having from 1 to 8
4 carbons, substituted and unsubstituted aryl groups, and substituted and
5 unsubstituted pyridinyl groups.

1 11. The method of claim 8, wherein R^3 is selected from the
2 group consisting of -H, -F, -Cl, -Br, -I, substituted and unsubstituted straight or

3 branched chain alkyl groups having from 1 to 8 carbon atoms, substituted and
4 unsubstituted aryl groups, substituted and unsubstituted aralkyl groups.

1 12. The method of claim 8, wherein R^6 and R^7 are
2 independently selected from the group consisting of $-H$, $-F$, $-Cl$, $-Br$, $-I$, $-OH$,
3 substituted and unsubstituted $-N(alkyl)(piperidinyl)$, substituted and
4 unsubstituted piperidinyl groups, substituted and unsubstituted morpholinyl
5 groups, substituted and unsubstituted piperazinyl groups; or R^6 may be
6 absent if B is nitrogen; or R^7 may be absent if C is nitrogen.

1 13. A method of inhibiting a serine/threonine kinase in a
2 subject or treating a biological condition mediated by a serine/threonine
3 kinase in a subject, comprising: administering to the subject a compound of
4 Structure I, a tautomer of the compound, a pharmaceutically acceptable salt
5 of the compound, a pharmaceutically acceptable salt of the tautomer, or
6 mixtures thereof wherein Structure I has the following formula and the
7 serine/threonine kinase is checkpoint kinase 1



8

9

wherein,

10

11

A, B, C, and D are independently selected from the group
consisting of carbon and nitrogen;

12 R^1 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
13 -CN, -NO₂, substituted and unsubstituted alkyl groups having
14 from 1 to 12 carbon atoms, substituted and unsubstituted
15 alkenyl groups having from 1 to 12 carbon atoms, substituted
16 and unsubstituted alkynyl groups having from 1 to 8 carbon
17 atoms, substituted and unsubstituted heterocyclyl groups, -OH,
18 substituted and unsubstituted alkoxy groups, substituted and
19 unsubstituted aryloxy groups, substituted and unsubstituted
20 arylalkoxy groups, substituted and unsubstituted heterocyclyloxy
21 groups, substituted and unsubstituted heterocyclylalkoxy
22 groups, -SH, substituted and unsubstituted -S-alkyl groups, -NH₂,
23 substituted and unsubstituted -N(H)(alkyl) groups, substituted
24 and unsubstituted -N(alkyl)₂ groups, substituted and
25 unsubstituted -N(H)(heterocyclyl) groups, substituted and
26 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
27 unsubstituted -N(heterocyclyl)₂ groups, substituted and
28 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
29 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, and substituted
30 and unsubstituted -N(heterocyclylalkyl)₂ groups;

31 R^2 and R^3 are independently selected from the group consisting
32 of -H, -F, -Cl, -Br, -I, -NO₂, -CN, substituted and unsubstituted
33 alkyl groups having from 1 to 12 carbon atoms, substituted and
34 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
35 substituted and unsubstituted alkynyl groups having from 1 to 8
36 carbon atoms, substituted and unsubstituted aryl groups,
37 substituted and unsubstituted aralkyl groups, substituted and
38 unsubstituted heterocyclyl groups, substituted and unsubstituted
39 heterocyclylalkyl groups, -SH, substituted and unsubstituted -S-
40 alkyl groups, substituted and unsubstituted -S(=O)₂-O-alkyl
41 groups, substituted and unsubstituted -S(=O)₂-alkyl groups,
42 substituted and unsubstituted -S(=O)₂-heterocyclyl groups,

43 substituted and unsubstituted -S(=O)-alkyl groups, substituted
44 and unsubstituted -S(=O)-heterocyclyl groups, -S(=O)₂-NH₂,
45 substituted and unsubstituted -S(=O)₂-N(H)(alkyl) groups,
46 substituted and unsubstituted -S(=O)₂-N(alkyl)₂ groups,
47 substituted and unsubstituted -S(=O)₂-N(H)(aryl) groups,
48 substituted and unsubstituted -S(=O)₂-N(alkyl)(aryl) groups,
49 substituted and unsubstituted -S(=O)₂-N(aryl)₂ groups,
50 substituted and unsubstituted -S(=O)₂-N(H)(aralkyl) groups,
51 substituted and unsubstituted -S(=O)₂-N(alkyl)(aralkyl) groups,
52 substituted and unsubstituted -S(=O)₂-N(aralkyl)₂ groups, -OH,
53 substituted and unsubstituted alkoxy groups, substituted and
54 unsubstituted aryloxy groups, substituted and unsubstituted
55 arylalkoxy groups, substituted and unsubstituted heterocyclyloxy
56 groups, substituted and unsubstituted heterocyclylalkoxy
57 groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups,
58 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
59 unsubstituted -N(H)(aryl) groups, substituted and unsubstituted
60 -N(alkyl)(aryl) groups, substituted and unsubstituted -N(aryl)₂
61 groups, substituted and unsubstituted -N(H)(aralkyl) groups,
62 substituted and unsubstituted -N(alkyl)(aralkyl) groups,
63 substituted and unsubstituted -N(aralkyl)₂ groups, substituted
64 and unsubstituted -N(H)(heterocyclyl) groups, substituted and
65 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
66 unsubstituted -N(heterocyclyl)₂ groups, substituted and
67 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
68 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
69 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
70 unsubstituted -N(H)-S(=O)₂-alkyl groups, substituted and
71 unsubstituted -N(H)-S(=O)₂-aryl groups, substituted and
72 unsubstituted -N(H)-S(=O)₂-aralkyl groups, substituted and
73 unsubstituted -N(H)-S(=O)₂-heterocyclyl groups, substituted and
74 unsubstituted -N(H)-S(=O)₂-heterocyclylalkyl groups, substituted

75 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
76 unsubstituted -N(H)-C(=O)-aryl groups, substituted and
77 unsubstituted -N(H)-C(=O)-aralkyl groups, substituted and
78 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
79 unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups, substituted
80 and unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
81 unsubstituted -N(alkyl)-C(=O)-aryl groups, substituted and
82 unsubstituted -N(alkyl)-C(=O)-aralkyl groups, substituted and
83 unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted
84 and unsubstituted -N(alkyl)-C(=O)-heterocyclylalkyl groups,
85 substituted and unsubstituted -N(alkyl)-S(=O)-alkyl groups,
86 substituted and unsubstituted -N(alkyl)-S(=O)-aryl groups,
87 substituted and unsubstituted -N(alkyl)-S(=O)-aralkyl groups,
88 substituted and unsubstituted -N(alkyl)-S(=O)-heterocyclyl
89 groups, substituted and unsubstituted
90 -N(alkyl)-S(=O)-heterocyclylalkyl groups, -N(H)-C(=O)-NH₂,
91 substituted and unsubstituted -N(H)-C(=O)-N(H)(alkyl) groups,
92 substituted and unsubstituted -N(H)-C(=O)-N(alkyl)₂ groups,
93 substituted and unsubstituted -N(H)-C(=O)-N(H)(aryl) groups,
94 substituted and unsubstituted -N(H)-C(=O)-N(alkyl)(aryl) groups,
95 substituted and unsubstituted -N(H)-C(=O)-N(aryl)₂ groups,
96 substituted and unsubstituted -N(H)-C(=O)-N(H)(aralkyl) groups,
97 substituted and unsubstituted -N(H)-C(=O)-N(alkyl)(aralkyl)
98 groups, substituted and unsubstituted -N(H)-C(=O)-N(aralkyl)₂
99 groups, substituted and unsubstituted
100 -N(H)-C(=O)-N(H)(heterocyclyl) groups, substituted and
101 unsubstituted -N(H)-C(=O)-N(alkyl)(heterocyclyl) groups,
102 substituted and unsubstituted -N(H)-C(=O)-N(heterocyclyl)₂
103 groups, substituted and unsubstituted
104 -N(H)-C(=O)-N(H)(heterocyclylalkyl) groups, substituted and
105 unsubstituted -N(H)-C(=O)-N(alkyl)(heterocyclylalkyl) groups,
106 substituted and unsubstituted -N(H)-C(=O)-N(heterocyclylalkyl)₂

107	groups, substituted and unsubstituted -N(alkyl)-C(=O)-NH ₂
108	groups, substituted and unsubstituted
109	-N(alkyl)-C(=O)-N(H)(alkyl) groups substituted and unsubstituted
110	-N(alkyl)-C(=O)-N(alkyl) ₂ groups, substituted and unsubstituted
111	-N(alkyl)-C(=O)-N(H)(aryl) groups, substituted and unsubstituted
112	-N(alkyl)-C(=O)-N(alkyl)(aryl) groups, substituted and
113	unsubstituted -N(alkyl)-C(=O)-N(aryl) ₂ groups, substituted and
114	unsubstituted -N(alkyl)-C(=O)-N(H)(aralkyl) groups, substituted
115	and unsubstituted -N(alkyl)-C(=O)-N(alkyl)(aralkyl) groups,
116	substituted and unsubstituted -N(alkyl)-C(=O)-N(aralkyl) ₂
117	groups, substituted and unsubstituted
118	-N(alkyl)-C(=O)-N(H)(heterocyclyl) groups, substituted and
119	unsubstituted -N(alkyl)-C(=O)-N(alkyl)(heterocyclyl) groups,
120	substituted and unsubstituted -N(alkyl)-C(=O)-N(heterocyclyl) ₂
121	groups, substituted and unsubstituted
122	-N(alkyl)-C(=O)-N(H)(heterocyclylalkyl) groups, substituted and
123	unsubstituted -N(alkyl)-C(=O)-N(alkyl)(heterocyclylalkyl) groups,
124	substituted and unsubstituted
125	-N(alkyl)-C(=O)-N(heterocyclylalkyl) ₂ groups, substituted and
126	unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
127	-C(=O)-aryl groups, substituted and unsubstituted -C(=O)-aralkyl
128	groups, substituted and unsubstituted -C(=O)-heterocyclyl
129	groups, substituted and unsubstituted -C(=O)-heterocyclylalkyl
130	groups, -C(=O)-NH ₂ , substituted and unsubstituted
131	-C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
132	-C(=O)-N(alkyl) ₂ groups, substituted and unsubstituted
133	-C(=O)-N(H)(aryl) groups, substituted and unsubstituted
134	-C(=O)-N(alkyl)(aryl) groups, substituted and unsubstituted
135	-C(=O)-N(aryl) ₂ groups, substituted and unsubstituted
136	-C(=O)-N(H)(aralkyl) groups, substituted and unsubstituted
137	-C(=O)-N(alkyl)(aralkyl) groups, substituted and unsubstituted
138	-C(=O)-N(aralkyl) ₂ groups, substituted and unsubstituted

139 -C(=O)-N(H)(heterocyclyl) groups, substituted and unsubstituted
140 -C(=O)-N(alkyl)(heterocyclyl) groups, substituted and
141 unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted and
142 unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups, substituted
143 and unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl) groups,
144 substituted and unsubstituted -C(=O)-N(heterocyclylalkyl)₂
145 groups, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl
146 groups, substituted and unsubstituted -C(=O)-O-aryl groups,
147 substituted and unsubstituted -C(=O)-O-heterocyclyl groups,
148 and substituted and unsubstituted -C(=O)-O-heterocyclylalkyl
149 groups;

150 R⁴ is selected from the group consisting of -H and substituted
151 and unsubstituted alkyl groups having from 1 to 12 carbon
152 atoms;

153 R⁵ and R⁸ are independently selected from the group consisting
154 of -H, substituted and unsubstituted alkyl groups having from 1
155 to 12 carbon atoms, substituted and unsubstituted alkenyl
156 groups having from 1 to 12 carbon atoms, substituted and
157 unsubstituted heterocyclyl groups; or R⁵ may be absent if A is
158 nitrogen; or R⁸ may be absent if D is nitrogen;

159 R⁶ and R⁷ are independently selected from the group consisting
160 of -H, -F, -Cl, -Br, -I, -NO₂, -CN, substituted and unsubstituted
161 alkyl groups having from 1 to 12 carbon atoms, substituted and
162 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
163 substituted and unsubstituted alkynyl groups having from 1 to 8
164 carbon atoms, substituted and unsubstituted heterocyclyl
165 groups, substituted and unsubstituted heterocyclylalkyl groups,
166 -SH, substituted and unsubstituted -S-alkyl groups, substituted

167 and unsubstituted $-S(=O)_2-O$ -alkyl groups, substituted and
168 unsubstituted $-S(=O)_2$ -alkyl groups, substituted and
169 unsubstituted $-S(=O)_2$ -heterocyclyl groups, substituted and
170 unsubstituted $-S(=O)$ -alkyl groups, substituted and unsubstituted
171 $-S(=O)$ -heterocyclyl groups, $-S(=O)_2-NH_2$, substituted and
172 unsubstituted $-S(=O)_2-N(H)(alkyl)$ groups, substituted and
173 unsubstituted $-S(=O)_2-N(alkyl)_2$ groups, substituted and
174 unsubstituted $-S(=O)_2-N(H)(heterocyclyl)$ groups, substituted
175 and unsubstituted $-S(=O)_2-N(alkyl)(heterocyclyl)$ groups,
176 substituted and unsubstituted $-S(=O)_2-N(heterocyclyl)_2$ groups,
177 substituted and unsubstituted $-S(=O)_2-N(H)(heterocyclylalkyl)$
178 groups, substituted and unsubstituted
179 $-S(=O)_2-N(alkyl)(heterocyclylalkyl)$ groups, substituted and
180 unsubstituted $-S(=O)_2-N(heterocyclylalkyl)_2$ groups, $-OH$,
181 substituted and unsubstituted alkoxy groups, substituted and
182 unsubstituted aryloxy groups, substituted and unsubstituted
183 arylalkoxy groups, substituted and unsubstituted heterocyclyloxy
184 groups, substituted and unsubstituted heterocyclylalkoxy
185 groups, $-NH_2$, substituted and unsubstituted $-N(H)(alkyl)$ groups,
186 substituted and unsubstituted $-N(alkyl)_2$ groups, substituted and
187 unsubstituted $-N(H)(aryl)$ groups, substituted and unsubstituted
188 $-N(alkyl)(aryl)$ groups, substituted and unsubstituted $-N(aryl)_2$
189 groups, substituted and unsubstituted $-N(H)(aralkyl)$ groups,
190 substituted and unsubstituted $-N(alkyl)(aralkyl)$ groups,
191 substituted and unsubstituted $-N(aralkyl)_2$ groups, substituted
192 and unsubstituted $-N(H)(heterocyclyl)$ groups, substituted and
193 unsubstituted $-N(alkyl)(heterocyclyl)$ groups, substituted and
194 unsubstituted $-N(heterocyclyl)_2$ groups, substituted and
195 unsubstituted $-N(H)(heterocyclylalkyl)$ groups, substituted and
196 unsubstituted $-N(alkyl)(heterocyclylalkyl)$ groups, substituted and
197 unsubstituted $-N(heterocyclylalkyl)_2$ groups, substituted and
198 unsubstituted $-N(H)-S(=O)_2$ -alkyl groups, substituted and

199 unsubstituted -N(H)-S(=O)₂-heterocyclyl groups, substituted and
200 unsubstituted -N(H)-S(=O)₂-heterocyclylalkyl groups, substituted
201 and unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
202 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
203 unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups, substituted
204 and unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
205 unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted
206 and unsubstituted -N(alkyl)-C(=O)-heterocyclylalkyl groups,
207 substituted and unsubstituted -N(alkyl)-S(=O)₂-alkyl groups,
208 substituted and unsubstituted -N(alkyl)-S(=O)₂-heterocyclyl
209 groups, substituted and unsubstituted
210 -N(alkyl)-S(=O)₂-heterocyclylalkyl groups, substituted and
211 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
212 -C(=O)-heterocyclyl groups, substituted and unsubstituted
213 -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and
214 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
215 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
216 unsubstituted -C(=O)-N(H)(aryl) groups, substituted and
217 unsubstituted -C(=O)-N(alkyl)(aryl) groups, substituted and
218 unsubstituted -C(=O)-N(aryl)₂ groups, substituted and
219 unsubstituted -C(=O)-N(H)(aralkyl) groups, substituted and
220 unsubstituted -C(=O)-N(alkyl)(aralkyl) groups, substituted and
221 unsubstituted -C(=O)-N(aralkyl)₂ groups, substituted and
222 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
223 unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted
224 and unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted
225 and unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups,
226 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl)
227 groups, substituted and unsubstituted
228 -C(=O)-N(heterocyclylalkyl)₂ groups, -CO₂H, substituted and
229 unsubstituted -C(=O)-O-alkyl groups, substituted and
230 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted

231 and unsubstituted -C(=O)-O-heterocyclalkyl groups; or R⁶ may
232 be absent if B is nitrogen; or R⁷ may be absent if C is nitrogen;

233 R⁹ is selected from the group consisting of -H, substituted and
234 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
235 substituted and unsubstituted aryl groups, substituted and
236 unsubstituted aralkyl groups, substituted and unsubstituted
237 heterocycl groups, substituted and unsubstituted
238 heterocyclalkyl groups, substituted and unsubstituted
239 heterocyclaminoalkyl groups, substituted and unsubstituted
240 alkoxy groups, and -NH₂, or R⁹ and R¹⁰ join together to form one
241 or more rings, each having 5, 6, or 7 ring members; and

242 R¹⁰ is -H, or R⁹ and R¹⁰ join together to form one or more rings,
243 each having 5, 6, or 7 ring members.

1 14. The method of claim 13, wherein

2 R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
3 -CN, -NO₂, substituted and unsubstituted straight and branched
4 chain alkyl groups having from 1 to 8 carbon atoms, substituted
5 and unsubstituted cycloalkyl groups, substituted and
6 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
7 substituted and unsubstituted heterocycl groups, -OH,
8 substituted and unsubstituted alkoxy groups, substituted and
9 unsubstituted aryloxy groups, substituted and unsubstituted
10 arylalkoxy groups, substituted and unsubstituted heterocyclloxy
11 groups, substituted and unsubstituted heterocyclalkoxy
12 groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups,
13 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
14 unsubstituted -N(H)(heterocycl) groups, substituted and

- 15 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
16 unsubstituted -N(H)(heterocyclylalkyl) groups, and substituted
17 and unsubstituted -N(alkyl)(heterocyclylalkyl) groups;
- 18 R^2 and R^3 are independently selected from the group consisting
19 of -H, -F, -Cl, -Br, -I, -NO₂, -CN, substituted and unsubstituted
20 alkyl groups having from 1 to 12 carbon atoms, substituted and
21 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
22 substituted and unsubstituted alkynyl groups having from 1 to 8
23 carbon atoms, substituted and unsubstituted aryl groups,
24 substituted and unsubstituted aralkyl groups, substituted and
25 unsubstituted heterocyclyl groups, substituted and unsubstituted
26 heterocyclylalkyl groups, -OH, substituted and unsubstituted
27 alkoxy groups, substituted and unsubstituted aryloxy groups,
28 substituted and unsubstituted arylalkoxy groups, substituted and
29 unsubstituted heterocyclyoxy groups, substituted and
30 unsubstituted heterocyclylalkoxy groups, -NH₂, substituted and
31 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
32 -N(alkyl)₂ groups, substituted and unsubstituted -N(H)(aryl)
33 groups, substituted and unsubstituted -N(alkyl)(aryl) groups,
34 substituted and unsubstituted -N(aryl)₂ groups, substituted and
35 unsubstituted -N(H)(aralkyl) groups, substituted and
36 unsubstituted -N(alkyl)(aralkyl) groups, substituted and
37 unsubstituted -N(aralkyl)₂ groups, substituted and unsubstituted
38 -N(H)(heterocyclyl) groups, substituted and unsubstituted
39 -N(alkyl)(heterocyclyl) groups, substituted and unsubstituted
40 -N(heterocyclyl)₂ groups, substituted and unsubstituted
41 -N(H)(heterocyclylalkyl) groups, substituted and unsubstituted
42 -N(alkyl)(heterocyclylalkyl) groups, substituted and unsubstituted
43 -N(heterocyclylalkyl)₂ groups, substituted and unsubstituted
44 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
45 -N(H)-C(=O)-aryl groups, substituted and unsubstituted

46	-N(H)-C(=O)-aralkyl groups, substituted and unsubstituted
47	-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
48	-N(H)-C(=O)-heterocyclylalkyl groups, substituted and
49	unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
50	unsubstituted -N(alkyl)-C(=O)-aryl groups, substituted and
51	unsubstituted -N(alkyl)-C(=O)-aralkyl groups, substituted and
52	unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted
53	and unsubstituted -N(alkyl)-C(=O)-heterocyclylalkyl groups,
54	-N(H)-C(=O)-NH ₂ , substituted and unsubstituted
55	-N(H)-C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
56	-N(H)-C(=O)-N(alkyl) ₂ groups, substituted and unsubstituted
57	-N(H)-C(=O)-N(H)(aryl) groups, substituted and unsubstituted
58	-N(H)-C(=O)-N(alkyl)(aryl) groups, substituted and unsubstituted
59	-N(H)-C(=O)-N(aryl) ₂ groups, substituted and unsubstituted
60	-N(H)-C(=O)-N(H)(aralkyl) groups, substituted and unsubstituted
61	-N(H)-C(=O)-N(alkyl)(aralkyl) groups, substituted and
62	unsubstituted -N(H)-C(=O)-N(aralkyl) ₂ groups, substituted and
63	unsubstituted -N(H)-C(=O)-N(H)(heterocyclyl) groups,
64	substituted and unsubstituted -N(H)-C(=O)-N(alkyl)(heterocyclyl)
65	groups, substituted and unsubstituted
66	-N(H)-C(=O)-N(heterocyclyl) ₂ groups, substituted and
67	unsubstituted -N(H)-C(=O)-N(H)(heterocyclylalkyl) groups,
68	substituted and unsubstituted
69	-N(H)-C(=O)-N(alkyl)(heterocyclylalkyl) groups, substituted and
70	unsubstituted -N(H)-C(=O)-N(heterocyclylalkyl) ₂ groups,
71	substituted and unsubstituted -N(alkyl)-C(=O)-NH ₂ groups,
72	substituted and unsubstituted -N(alkyl)-C(=O)-N(H)(alkyl)
73	groups, substituted and unsubstituted -N(alkyl)-C(=O)-N(H)(aryl)
74	groups, substituted and unsubstituted
75	-N(alkyl)-C(=O)-N(H)(aralkyl) groups, substituted and
76	unsubstituted -N(alkyl)-C(=O)-N(H)(heterocyclyl) groups,
77	substituted and unsubstituted

- 78 -N(alkyl)-C(=O)-N(H)(heterocyclalkyl) groups, substituted and
79 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
80 -C(=O)-aryl groups, substituted and unsubstituted -C(=O)-aralkyl
81 groups, substituted and unsubstituted -C(=O)-heterocycl
82 groups, substituted and unsubstituted -C(=O)-heterocyclalkyl
83 groups, -C(=O)-NH₂, substituted and unsubstituted
84 -C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
85 -C(=O)-N(alkyl)₂ groups, substituted and unsubstituted
86 -C(=O)-N(H)(aryl) groups, substituted and unsubstituted
87 -C(=O)-N(alkyl)(aryl) groups, substituted and unsubstituted
88 -C(=O)-N(aryl)₂ groups, substituted and unsubstituted
89 -C(=O)-N(H)(aralkyl) groups, substituted and unsubstituted
90 -C(=O)-N(alkyl)(aralkyl) groups, substituted and unsubstituted
91 -C(=O)-N(aralkyl)₂ groups, -CO₂H, substituted and unsubstituted
92 -C(=O)-O-alkyl groups, substituted and unsubstituted
93 -C(=O)-O-aryl groups, substituted and unsubstituted
94 -C(=O)-O-heterocycl groups, and substituted and
95 unsubstituted -C(=O)-O-heterocyclalkyl groups;
- 96 R⁶ and R⁷ are independently selected from the group consisting
97 of -H, -F, -Cl, -Br, -I, -NO₂, -CN, substituted and unsubstituted
98 alkyl groups having from 1 to 12 carbon atoms, substituted and
99 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
100 substituted and unsubstituted alkynyl groups having from 1 to 8
101 carbon atoms, substituted and unsubstituted heterocycl
102 groups, substituted and unsubstituted heterocyclalkyl groups,
103 -S(=O)₂-NH₂, substituted and unsubstituted -S(=O)₂-N(H)(alkyl)
104 groups, substituted and unsubstituted -S(=O)₂-N(alkyl)₂ groups,
105 -OH, substituted and unsubstituted alkoxy groups, substituted
106 and unsubstituted aryloxy groups, substituted and unsubstituted
107 aralkoxy groups, substituted and unsubstituted heterocycloxy
108 groups, substituted and unsubstituted heterocyclalkoxy

109 groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups,
110 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
111 unsubstituted -N(H)(heterocyclyl) groups, substituted and
112 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
113 unsubstituted -N(heterocyclyl)₂ groups, substituted and
114 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
115 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
116 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
117 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
118 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
119 unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups, substituted
120 and unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
121 unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted
122 and unsubstituted -N(alkyl)-C(=O)-heterocyclylalkyl groups,
123 substituted and unsubstituted -C(=O)-alkyl groups, substituted
124 and unsubstituted -C(=O)-heterocyclyl groups, substituted and
125 unsubstituted -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂,
126 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
127 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
128 substituted and unsubstituted -C(=O)-N(H)(heterocyclyl) groups,
129 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclyl)
130 groups, substituted and unsubstituted -C(=O)-N(heterocyclyl)₂
131 groups, substituted and unsubstituted
132 -C(=O)-N(H)(heterocyclylalkyl) groups, substituted and
133 unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl) groups,
134 substituted and unsubstituted -C(=O)-N(heterocyclylalkyl)₂
135 groups, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl
136 groups, substituted and unsubstituted -C(=O)-O-heterocyclyl
137 groups, and substituted and unsubstituted
138 -C(=O)-O-heterocyclylalkyl groups; or R⁶ may be absent if B is
139 nitrogen; or R⁷ may be absent if C is nitrogen.

1 15. The method of claim 13, wherein R⁹ is selected from the
2 group consisting of substituted and unsubstituted straight and branched chain
3 alkyl groups having from 1 to 8 carbon atoms, substituted and unsubstituted
4 cycloalkyl groups, substituted and unsubstituted aryl groups, substituted and
5 unsubstituted aralkyl groups, substituted and unsubstituted heterocyclyl
6 groups, substituted and unsubstituted heterocyclylalkyl groups, and
7 substituted and unsubstituted heterocyclylaminoalkyl groups.

1 16. The method of claim 13, wherein R⁹ is selected from the
2 group consisting of substituted and unsubstituted cyclohexyl groups,
3 substituted and unsubstituted cyclohexylalkyl groups, substituted and
4 unsubstituted pyrrolidinyl groups, substituted and unsubstituted
5 pyrrolidinylalkyl groups, substituted and unsubstituted tetrahydrofuranylalkyl
6 groups, substituted and unsubstituted piperidinyl groups, substituted and
7 unsubstituted piperidinylalkyl groups, substituted and unsubstituted
8 piperazinylalkyl groups, substituted and unsubstituted morpholinylalkyl
9 groups, and substituted and unsubstituted quinuclidinyl groups.

1 17. The method of claim 13, wherein R¹ is selected from the
2 group consisting of -H, -F, -Cl, -Br, -I, substituted and unsubstituted straight
3 and branched chain alkyl groups having from 1 to 4 carbon atoms, substituted
4 and unsubstituted heterocyclyl groups, -OH, substituted and unsubstituted
5 alkoxy groups, substituted and unsubstituted aryloxy groups, substituted and
6 unsubstituted heterocyclyoxy groups, substituted and unsubstituted
7 heterocyclylalkoxy groups, and substituted and unsubstituted -N(H)(alkyl)
8 groups.

1 18. The method of claim 13, wherein R³ is selected from the
2 group consisting of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and
3 unsubstituted straight or branched chain alkyl groups having from 1 to 8
4 carbon atoms, -OH, substituted and unsubstituted alkoxy groups, substituted

5 and unsubstituted heterocyclyloxy groups, and substituted and unsubstituted
6 heterocyclylalkoxy groups.

1 19. The method of claim 13, wherein R⁶ and R⁷ are
2 independently selected from the group consisting of -H, -F, -Cl, -Br, -I,
3 substituted and unsubstituted alkyl groups having from 1 to 8 carbon atoms,
4 substituted and unsubstituted heterocyclyl groups, substituted and
5 unsubstituted heterocyclylalkyl groups, -S(=O)₂-NH₂, substituted and
6 unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and unsubstituted
7 -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and unsubstituted alkoxy groups,
8 substituted and unsubstituted aryloxy groups, substituted and unsubstituted
9 arylalkoxy groups, substituted and unsubstituted heterocyclyloxy groups,
10 substituted and unsubstituted heterocyclylalkoxy groups, -NH₂, substituted
11 and unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
12 groups, substituted and unsubstituted -N(H)(heterocyclyl) groups, substituted
13 and unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
14 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and unsubstituted
15 -N(alkyl)(heterocyclylalkyl) groups, substituted and unsubstituted -C(=O)-alkyl
16 groups, substituted and unsubstituted -C(=O)-heterocyclyl groups, substituted
17 and unsubstituted -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted
18 and unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
19 -C(=O)-N(alkyl)₂ groups, substituted and unsubstituted
20 -C(=O)-N(H)(heterocyclyl) groups, substituted and unsubstituted
21 -C(=O)-N(alkyl)(heterocyclyl) groups, substituted and unsubstituted
22 -C(=O)-N(H)(heterocyclylalkyl) groups, substituted and unsubstituted
23 -C(=O)-N(alkyl)(heterocyclylalkyl) groups, -CO₂H, substituted and
24 unsubstituted -C(=O)-O-alkyl groups, substituted and unsubstituted
25 -C(=O)-O-heterocyclyl groups, and substituted and unsubstituted
26 -C(=O)-O-heterocyclylalkyl groups; or R⁶ may be absent if B is nitrogen; or R⁷
27 may be absent if C is nitrogen.

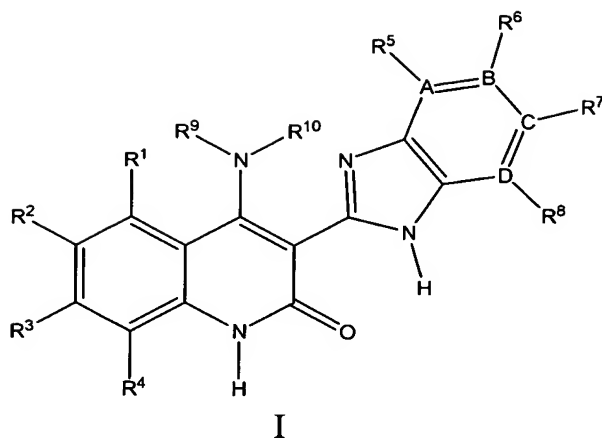
1 20. The method of claim 13, wherein R⁶ and R⁷ are
2 independently selected from the group consisting of substituted and
3 unsubstituted heterocyclyl groups and substituted and unsubstituted
4 heterocyclylalkyl groups; or R⁶ may be absent if B is nitrogen; or R⁷ may be
5 absent if C is nitrogen.

1 21. The method of claim 13, wherein R⁶ and R⁷ are
2 independently selected from the group consisting of substituted and
3 unsubstituted pyrrolidinyl groups, substituted and unsubstituted
4 piperidinylalkyl groups, substituted and unsubstituted piperazinyl groups,
5 substituted and unsubstituted morpholinyl groups, substituted and
6 unsubstituted thiomorpholinyl groups, substituted and unsubstituted
7 dizepanyl groups, substituted and unsubstituted oxazepanyl groups, and
8 pyridinylalkyl groups.

1 22. The method of claim 13, wherein the IC₅₀ value of the
2 compound is less than or equal to 0.001 μM.

1 23. The method of claim 13, wherein the biological condition
2 is cancer.

1 24. A method of inhibiting a serine/threonine kinase in a
2 subject or treating a biological condition mediated by a serine/threonine
3 kinase in a subject, comprising: administering to the subject a compound of
4 Structure I, a tautomer of the compound, a pharmaceutically acceptable salt
5 of the compound, a pharmaceutically acceptable salt of the tautomer, or
6 mixtures thereof wherein Structure I has the following formula and the
7 serine/threonine kinase is ribosomal S6 kinase 2



8

9

wherein,

10

A, B, C, and D are independently selected from the group
consisting of carbon and nitrogen;

11

12

R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I,

13

-CN, -NO₂, substituted and unsubstituted alkyl groups having

14

from 1 to 12 carbon atoms, substituted and unsubstituted

15

alkenyl groups having from 1 to 12 carbon atoms, substituted

16

and unsubstituted heterocyclyl groups, substituted and

17

unsubstituted heterocyclylalkyl groups, -OH, substituted and

18

unsubstituted alkoxy groups, substituted and unsubstituted

19

heterocycloxy groups, substituted and unsubstituted

20

heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted

21

-N(H)(alkyl) groups, substituted and unsubstituted

22

-N(H)(heterocyclyl) groups, substituted and unsubstituted

23

-N(H)(heterocyclylalkyl) groups, substituted and unsubstituted

24

-N(H)-C(=O)-alkyl groups, substituted and unsubstituted

25

-N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted

26

-N(H)-C(=O)-heterocyclylalkyl groups, substituted and

27

unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted

28

-C(=O)-heterocyclyl groups, substituted and unsubstituted

29

-C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and

30 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
31 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
32 unsubstituted -C(=O)-N(H)(heterocyclyl) groups,
33 -C(=O)-N(H)(heterocyclylalkyl) groups, -CO₂H, substituted and
34 unsubstituted -C(=O)-O-alkyl groups, substituted and
35 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted
36 and unsubstituted -C(=O)-O-heterocyclylalkyl groups;

37 R² and R³ are independently selected from the group consisting
38 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
39 alkyl groups having from 1 to 12 carbon atoms, substituted and
40 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
41 substituted and unsubstituted aryl groups, substituted and
42 unsubstituted aralkyl groups, substituted and unsubstituted
43 heterocyclyl groups, substituted and unsubstituted
44 heterocyclylalkyl groups, -SH, substituted and unsubstituted -S-
45 alkyl groups, substituted and unsubstituted -S-aryl groups,
46 substituted and unsubstituted -S-aralkyl groups, -OH,
47 substituted and unsubstituted alkoxy groups, substituted and
48 unsubstituted heterocycloxy groups, substituted and
49 unsubstituted heterocyclylalkoxy groups, -NH₂, substituted and
50 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
51 -N(alkyl)₂ groups, substituted and unsubstituted -N(H)(aryl)
52 groups, substituted and unsubstituted -N(H)(aralkyl) groups,
53 substituted and unsubstituted -N(H)(heterocyclyl) groups,
54 substituted and unsubstituted -N(H)(heterocyclylalkyl) groups,
55 substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
56 substituted and unsubstituted -N(H)-C(=O)-aryl groups,
57 substituted and unsubstituted -N(H)-C(=O)-aralkyl groups,
58 substituted and unsubstituted -N(H)-C(=O)-heterocyclyl groups,
59 substituted and unsubstituted -N(H)-C(=O)-heterocyclylalkyl
60 groups, substituted and unsubstituted -C(=O)-alkyl groups,

61 substituted and unsubstituted -C(=O)-aryl groups, substituted
62 and unsubstituted -C(=O)-aralkyl groups, substituted and
63 unsubstituted -C(=O)-heterocyclyl groups, substituted and
64 unsubstituted -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂,
65 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
66 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
67 substituted and unsubstituted -C(=O)-N(H)(aryl) groups,
68 substituted and unsubstituted -C(=O)-N(H)(aralkyl) groups,
69 substituted and unsubstituted -C(=O)-N(H)(heterocyclyl) groups,
70 -C(=O)-N(H)(heterocyclylalkyl) groups, -CO₂H, substituted and
71 unsubstituted -C(=O)-O-alkyl groups, substituted and
72 unsubstituted -C(=O)-O-aryl groups, substituted and
73 unsubstituted -C(=O)-O-aralkyl groups, substituted and
74 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted
75 and unsubstituted -C(=O)-O-heterocyclylalkyl groups; or R² and
76 R³ may join together to form a cyclic group,

77 R⁴, R⁵, and R⁸ are independently selected from the group
78 consisting of -H and substituted and unsubstituted straight and
79 branched chain alkyl groups having from 1 to 8 carbon atoms; or
80 R⁵ may be absent if A is nitrogen; or R⁸ may be absent if D is
81 nitrogen.

82 R⁶ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
83 -CN, -NO₂, substituted and unsubstituted alkyl groups having
84 from 1 to 12 carbon atoms, substituted and unsubstituted
85 alkenyl groups having from 1 to 12 carbon atoms, substituted
86 and unsubstituted heterocyclyl groups, substituted and
87 unsubstituted heterocyclylalkyl groups, -OH, substituted and
88 unsubstituted alkoxy groups, substituted and unsubstituted
89 heterocycloxy groups, substituted and unsubstituted

- 90 heterocyclalkoxy groups, $-\text{CO}_2\text{H}$, $-\text{C}(=\text{O})-\text{NH}_2$, substituted and
91 unsubstituted $-\text{C}(=\text{O})-\text{N}(\text{H})(\text{alkyl})$ groups, substituted and
92 unsubstituted $-\text{C}(=\text{O})-\text{N}(\text{alkyl})_2$ groups, substituted and
93 unsubstituted $-\text{C}(=\text{O})-\text{N}(\text{H})(\text{heterocycl})$ groups,
94 $-\text{C}(=\text{O})-\text{N}(\text{H})(\text{heterocyclalkyl})$ groups, substituted and
95 unsubstituted $-\text{C}(=\text{O})-\text{O}-\text{alkyl}$ groups, substituted and
96 unsubstituted $-\text{C}(=\text{O})-\text{O}-\text{heterocycl}$ groups, substituted and
97 unsubstituted $-\text{C}(=\text{O})-\text{O}-\text{heterocyclalkyl}$ groups, substituted
98 and unsubstituted $-\text{C}(=\text{O})-\text{alkyl}$ groups, substituted and
99 unsubstituted $-\text{C}(=\text{O})-\text{heterocycl}$ groups, substituted and
100 unsubstituted $-\text{C}(=\text{O})-\text{heterocyclalkyl}$ groups, $-\text{NH}_2$, substituted
101 and unsubstituted $-\text{N}(\text{H})(\text{alkyl})$ groups, substituted and
102 unsubstituted $-\text{N}(\text{H})(\text{heterocycl})$ groups, substituted and
103 unsubstituted $-\text{N}(\text{H})(\text{heterocyclalkyl})$ groups, substituted and
104 unsubstituted $-\text{N}(\text{H})-\text{C}(=\text{O})-\text{alkyl}$ groups, substituted and
105 unsubstituted $-\text{N}(\text{H})-\text{C}(=\text{O})-\text{heterocycl}$ groups, and substituted
106 and unsubstituted $-\text{N}(\text{H})-\text{C}(=\text{O})-\text{heterocyclalkyl}$ groups;
- 107 R^7 is selected from the group consisting of $-\text{H}$, $-\text{F}$, $-\text{Cl}$, $-\text{Br}$, $-\text{I}$,
108 $-\text{CN}$, $-\text{NO}_2$, substituted and unsubstituted alkyl groups having
109 from 1 to 12 carbon atoms, substituted and unsubstituted
110 alkenyl groups having from 1 to 12 carbon atoms, substituted
111 and unsubstituted heterocycl groups, substituted and
112 unsubstituted heterocyclalkyl groups, $-\text{OH}$, substituted and
113 unsubstituted alkoxy groups, substituted and unsubstituted
114 heterocycloxy groups, substituted and unsubstituted
115 heterocyclalkoxy groups, $-\text{SH}$, substituted and unsubstituted
116 $-\text{S}-\text{alkyl}$ groups, $-\text{CO}_2\text{H}$, $-\text{C}(=\text{O})-\text{NH}_2$, substituted and
117 unsubstituted $-\text{C}(=\text{O})-\text{N}(\text{H})(\text{alkyl})$ groups, substituted and
118 unsubstituted $-\text{C}(=\text{O})-\text{N}(\text{alkyl})_2$ groups, substituted and
119 unsubstituted $-\text{C}(=\text{O})-\text{N}(\text{H})(\text{heterocycl})$ groups,
120 $-\text{C}(=\text{O})-\text{N}(\text{H})(\text{heterocyclalkyl})$ groups, substituted and

121 unsubstituted -C(=O)-O-alkyl groups, substituted and
122 unsubstituted -C(=O)-O-heterocyclyl groups, substituted and
123 unsubstituted -C(=O)-O-heterocyclylalkyl groups, substituted
124 and unsubstituted -C(=O)-alkyl groups, substituted and
125 unsubstituted -C(=O)-heterocyclyl groups, substituted and
126 unsubstituted -C(=O)-heterocyclylalkyl groups, -NH₂, substituted
127 and unsubstituted -N(H)(alkyl) groups, substituted and
128 unsubstituted -N(alkyl)₂ groups, substituted and unsubstituted
129 -N(H)(heterocyclyl) groups, substituted and unsubstituted
130 -N(alkyl)(heterocyclyl) groups, substituted and unsubstituted
131 -N(heterocyclyl)₂ groups, substituted and unsubstituted
132 -N(H)(heterocyclylalkyl) groups, substituted and unsubstituted
133 -N(alkyl)(heterocyclylalkyl) groups, substituted and unsubstituted
134 -N(heterocyclylalkyl)₂ groups, substituted and unsubstituted
135 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
136 -N(H)-C(=O)-heterocyclyl groups, and substituted and
137 unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups; or R⁷ may
138 be absent if C is nitrogen;

139 R⁹ is selected from the group consisting of -H, substituted and
140 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
141 substituted and unsubstituted alkenyl groups having from 1 to 12
142 carbon atoms, substituted and unsubstituted aryl groups,
143 substituted and unsubstituted aralkyl groups, substituted and
144 unsubstituted heterocyclyl groups, substituted and unsubstituted
145 heterocyclylalkyl groups, -OH, substituted and unsubstituted
146 alkoxy groups, substituted and unsubstituted aryloxy groups,
147 substituted and unsubstituted arylalkoxy groups, substituted and
148 unsubstituted heterocyclyloxy groups, substituted and
149 unsubstituted heterocyclylalkoxy groups, substituted and
150 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
151 -C(=O)-aryl groups, substituted and unsubstituted -C(=O)-aralkyl

152 groups, substituted and unsubstituted -C(=O)-heterocycl
153 groups, and substituted and unsubstituted
154 -C(=O)-heterocyclalkyl groups; or R⁹ and R¹⁰ join together to
155 form a ring having 5, 6, or 7 ring members; and

156 R¹⁰ is -H, or R⁹ and R¹⁰ join together to form a ring having 5, 6,
157 or 7 ring members.

1 25. The method of claim 24, wherein

2 R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
3 substituted and unsubstituted alkyl groups having from 1 to 12
4 carbon atoms, substituted and unsubstituted heterocycl
5 groups, substituted and unsubstituted heterocyclalkyl groups,
6 -OH, substituted and unsubstituted alkoxy groups, substituted
7 and unsubstituted heterocycloxy groups, and substituted and
8 unsubstituted heterocyclalkoxy groups;

9 R² and R³ are independently selected from the group consisting
10 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
11 alkyl groups having from 1 to 12 carbon atoms, substituted and
12 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
13 substituted and unsubstituted aryl groups, substituted and
14 unsubstituted aralkyl groups, substituted and unsubstituted
15 heterocycl groups, substituted and unsubstituted
16 heterocyclalkyl groups, -OH, substituted and unsubstituted
17 alkoxy groups, substituted and unsubstituted heterocycloxy
18 groups, substituted and unsubstituted heterocyclalkoxy
19 groups, and -CO₂H; or R² and R³ may join together to form a
20 cyclic group

21 R^6 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
22 substituted and unsubstituted alkyl groups having from 1 to 8
23 carbon atoms, substituted and unsubstituted heterocyclyl
24 groups, -OH, substituted and unsubstituted alkoxy groups,
25 substituted and unsubstituted heterocyclyloxy groups, and
26 substituted and unsubstituted heterocyclylalkoxy groups; or R^6
27 may be absent if B is nitrogen;

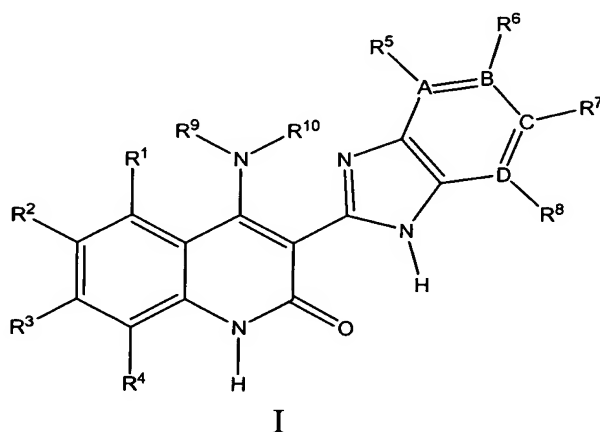
28 R^7 is selected from the group consisting -H, -F, -Cl, -Br, -I,
29 substituted and unsubstituted alkyl groups having from 1 to 8
30 carbon atoms, substituted and unsubstituted heterocyclyl
31 groups, -OH, substituted and unsubstituted alkoxy groups,
32 substituted and unsubstituted heterocyclyloxy groups, and
33 substituted and unsubstituted heterocyclylalkoxy groups; or R^7
34 may be absent if C is nitrogen.

1 26. The method of claim 24, wherein R^9 is selected from the
2 group consisting of -H, substituted and unsubstituted straight or branched
3 chain alkyl groups having from 1-12 carbon atoms, substituted and
4 unsubstituted cycloalkyl groups, substituted and unsubstituted aryl groups,
5 substituted and unsubstituted aralkyl groups, substituted and unsubstituted
6 saturated heterocyclyl groups, substituted and unsubstituted heterocyclylalkyl
7 groups wherein the heterocyclyl moiety is saturated, substituted and
8 unsubstituted alkoxy groups, and substituted and unsubstituted
9 heterocyclylalkoxy groups wherein the heterocyclyl moiety is saturated.

1 27. The method of claim 24, wherein R^1 is selected from the
2 group consisting of -H, -F, -Cl, substituted and unsubstituted morpholinyl
3 groups, substituted and unsubstituted morpholinylalkyl groups, and
4 substituted and unsubstituted morpholinylalkoxy groups.

1 28. The method of claim 24, wherein R^2 is selected from the
2 group consisting of -H, -F, -Cl, -Br, -I, -NO₂, -CH₃, -OCH₃, -CO₂H, substituted
3 and unsubstituted aryl groups, and substituted and unsubstituted pyridinyl
4 groups.

1 29. A method of inhibiting a serine/threonine kinase in a
2 subject or treating a biological condition mediated by a serine/threonine
3 kinase in a subject, comprising: administering to the subject a compound of
4 Structure I, a tautomer of the compound, a pharmaceutically acceptable salt
5 of the compound, a pharmaceutically acceptable salt of the tautomer, or
6 mixtures thereof wherein Structure I has the following formula and the
7 serine/threonine kinase is PAR-1



8

9

wherein,

10

11

A, B, C, and D are independently selected from the group
consisting of carbon and nitrogen;

12

13

14

15

R^1 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
-CN, -NO₂, substituted and unsubstituted alkyl groups having
from 1 to 12 carbon atoms, substituted and unsubstituted
alkenyl groups having from 1 to 12 carbon atoms, substituted

16 and unsubstituted heterocyclyl groups, and substituted and
17 unsubstituted heterocyclylalkyl groups;

18 R^2 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
19 -NO₂, -CN, substituted and unsubstituted alkyl groups having
20 from 1 to 12 carbon atoms, substituted and unsubstituted
21 alkenyl groups having from 1 to 12 carbon atoms, substituted
22 and unsubstituted aryl groups, substituted and unsubstituted
23 aralkyl groups, -OH, substituted and unsubstituted alkoxy,
24 substituted and unsubstituted heterocyclyloxy, substituted and
25 unsubstituted heterocyclylalkoxy, substituted and unsubstituted
26 -C(=O)-alkyl groups, substituted and unsubstituted -C(=O)-aryl,
27 substituted and unsubstituted -C(=O)-aralkyl, -CO₂H, substituted
28 and unsubstituted -C(=O)-O-alkyl groups, substituted and
29 unsubstituted -C(=O)-O-aryl groups, and substituted and
30 unsubstituted -C(=O)-O-aralkyl groups;

31 R^3 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
32 -NO₂, -CN, substituted and unsubstituted alkyl groups having
33 from 1 to 12 carbon atoms, substituted and unsubstituted
34 alkenyl groups having from 1 to 12 carbon atoms, substituted
35 and unsubstituted aryl groups, substituted and unsubstituted
36 aralkyl groups, substituted and unsubstituted heterocyclyl
37 groups, substituted and unsubstituted heterocyclylalkyl groups,
38 -SH, substituted and unsubstituted -S-alkyl groups, substituted
39 and unsubstituted -S(=O)₂-O-alkyl groups, substituted and
40 unsubstituted -S(=O)₂-alkyl groups, substituted and
41 unsubstituted -S(=O)₂-heterocyclyl groups, -S(=O)₂-NH₂,
42 substituted and unsubstituted -S(=O)₂-N(H)(alkyl) groups,
43 substituted and unsubstituted -S(=O)₂-N(alkyl)₂ groups,
44 substituted and unsubstituted -S(=O)-alkyl groups, substituted

45 and unsubstituted $-S(=O)$ -aryl groups, substituted and
46 unsubstituted $-S(=O)$ -heterocyclyl groups, $-OH$, substituted and
47 unsubstituted alkoxy groups, substituted and unsubstituted
48 aryloxy groups, substituted and unsubstituted heterocyclyloxy
49 groups, substituted and unsubstituted heterocyclalkoxy
50 groups, $-NH_2$, substituted and unsubstituted $-N(H)(alkyl)$ groups,
51 substituted and unsubstituted $-N(alkyl)_2$ groups, substituted and
52 unsubstituted $-N(H)(aryl)$ groups, substituted and unsubstituted
53 $-N(alkyl)(aryl)$ groups, substituted and unsubstituted $-N(aryl)_2$
54 groups, substituted and unsubstituted $-N(H)(aralkyl)$ groups,
55 substituted and unsubstituted $-N(alkyl)(aralkyl)$ groups,
56 substituted and unsubstituted $-N(aralkyl)_2$ groups, substituted
57 and unsubstituted $-N(H)(heterocyclyl)$ groups, substituted and
58 unsubstituted $-N(alkyl)(heterocyclyl)$ groups, substituted and
59 unsubstituted $-N(heterocyclyl)_2$ groups, substituted and
60 unsubstituted $-N(H)(heterocyclalkyl)$ groups, substituted and
61 unsubstituted $-N(alkyl)(heterocyclalkyl)$ groups, substituted and
62 unsubstituted $-N(heterocyclalkyl)_2$ groups, substituted and
63 unsubstituted $-N(H)-C(=O)$ -alkyl groups, substituted and
64 unsubstituted $-N(alkyl)-C(=O)$ -alkyl groups, substituted and
65 unsubstituted $-N(H)-C(=O)$ -aryl groups, substituted and
66 unsubstituted $-N(alkyl)-C(=O)$ -aryl groups, substituted and
67 unsubstituted $-N(H)-C(=O)$ -aralkyl groups, substituted and
68 unsubstituted $-N(alkyl)-C(=O)$ -aralkyl groups, substituted and
69 unsubstituted $-N(H)-C(=O)$ -heterocyclyl groups, substituted and
70 unsubstituted $-N(alkyl)-C(=O)$ -heterocyclyl groups, substituted
71 and unsubstituted $-N(H)-C(=O)$ -heterocyclalkyl groups,
72 substituted and unsubstituted $-N(alkyl)-C(=O)$ -heterocyclalkyl
73 groups, substituted and unsubstituted $-N(H)-S(=O)_2$ -alkyl
74 groups, substituted and unsubstituted $-N(H)-S(=O)_2$ -aryl,
75 substituted and unsubstituted $-N(H)-S(=O)_2$ -heterocyclyl groups,
76 substituted and unsubstituted $-C(=O)$ -alkyl groups, substituted

77 and unsubstituted -C(=O)-aryl, substituted and unsubstituted
78 -C(=O)-aralkyl, substituted and unsubstituted
79 -C(=O)-heterocyclyl groups, substituted and unsubstituted
80 -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and
81 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
82 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
83 unsubstituted -C(=O)-N(H)(aryl) groups, substituted and
84 unsubstituted -C(=O)-N(alkyl)(aryl) groups, substituted and
85 unsubstituted -C(=O)-N(aryl)₂ groups, substituted and
86 unsubstituted -C(=O)-N(H)(aralkyl) groups, substituted and
87 unsubstituted -C(=O)-N(alkyl)(aralkyl) groups, substituted and
88 unsubstituted -C(=O)-N(aralkyl)₂ groups, substituted and
89 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
90 unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted
91 and unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted
92 and unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups,
93 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl)
94 groups, substituted and unsubstituted -
95 C(=O)-N(heterocyclylalkyl)₂ groups, -CO₂H, substituted and
96 unsubstituted -C(=O)-O-alkyl groups, substituted and
97 unsubstituted -C(=O)-O-aryl groups, substituted and
98 unsubstituted -C(=O)-O-aralkyl groups, substituted and
99 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted
100 and unsubstituted -C(=O)-O-heterocyclylalkyl groups;

101 R⁴, R⁵ and R⁸ are independently selected from the group
102 consisting of -H and substituted and unsubstituted alkyl groups
103 having from 1 to 12 carbon atoms; or R⁵ may be absent if A is
104 nitrogen; or R⁸ may be absent if D is nitrogen;

105 R^6 and R^7 are independently selected from the group consisting
106 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
107 alkyl groups having from 1 to 12 carbon atoms, substituted and
108 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
109 substituted and unsubstituted heterocyclyl groups, substituted
110 and unsubstituted heterocyclylalkyl groups, -SH, substituted and
111 unsubstituted -S-alkyl groups, substituted and unsubstituted
112 -S-heterocyclyl groups, -OH, substituted and unsubstituted
113 alkoxy groups, substituted and unsubstituted heterocycloxy
114 groups, substituted and unsubstituted heterocyclalkoxy
115 groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups,
116 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
117 unsubstituted -N(H)(heterocyclyl) groups, substituted and
118 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
119 unsubstituted -N(heterocyclyl)₂ groups, substituted and
120 unsubstituted -N(H)(heterocyclalkyl) groups, substituted and
121 unsubstituted -N(alkyl)(heterocyclalkyl) groups, and substituted
122 and unsubstituted -N(heterocyclalkyl)₂ groups; or R^6 is absent
123 if B is nitrogen; or R^7 is absent if C is nitrogen;

124 R^9 is selected from the group consisting of -H, substituted and
125 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
126 substituted and unsubstituted alkenyl groups having from 1 to 12
127 carbons, substituted and unsubstituted aryl groups, substituted
128 and unsubstituted aralkyl groups, substituted and unsubstituted
129 heterocyclyl groups, substituted and unsubstituted
130 heterocyclalkyl groups, -OH, substituted and unsubstituted
131 alkoxy groups, and substituted and unsubstituted
132 heterocyclalkoxy groups; and

133 R^{10} is -H.

1 30. The method of claim 29, wherein

2 R³ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
3 -NO₂, -CN, substituted and unsubstituted alkyl groups having
4 from 1 to 12 carbon atoms, substituted and unsubstituted
5 alkenyl groups having from 1 to 12 carbon atoms, substituted
6 and unsubstituted aryl groups, substituted and unsubstituted
7 aralkyl groups, substituted and unsubstituted heterocyclyl
8 groups, substituted and unsubstituted heterocyclylalkyl groups,
9 -OH, substituted and unsubstituted alkoxy groups, substituted
10 and unsubstituted aryloxy groups, substituted and unsubstituted
11 heterocycliloxy groups, substituted and unsubstituted
12 heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted
13 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
14 groups, substituted and unsubstituted -N(H)(aryl) groups,
15 substituted and unsubstituted -N(alkyl)(aryl) groups, substituted
16 and unsubstituted -N(aryl)₂ groups, substituted and
17 unsubstituted -N(H)(aralkyl) groups, substituted and
18 unsubstituted -N(alkyl)(aralkyl) groups, substituted and
19 unsubstituted -N(aralkyl)₂ groups, substituted and unsubstituted
20 -N(H)(heterocyclyl) groups, substituted and unsubstituted
21 -N(alkyl)(heterocyclyl) groups, substituted and unsubstituted
22 -N(heterocyclyl)₂ groups, substituted and unsubstituted
23 -N(H)(heterocyclylalkyl) groups, substituted and unsubstituted
24 -N(alkyl)(heterocyclylalkyl) groups, substituted and unsubstituted
25 -N(heterocyclylalkyl)₂ groups, substituted and unsubstituted
26 -C(=O)-alkyl groups, substituted and unsubstituted
27 -C(=O)-heterocyclyl groups, substituted and unsubstituted
28 -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and
29 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
30 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and

31 unsubstituted -C(=O)-N(H)(aryl) groups, substituted and
32 unsubstituted -C(=O)-N(alkyl)(aryl) groups, substituted and
33 unsubstituted -C(=O)-N(aryl)₂ groups, substituted and
34 unsubstituted -C(=O)-N(H)(aralkyl) groups, substituted and
35 unsubstituted -C(=O)-N(alkyl)(aralkyl) groups, substituted and
36 unsubstituted -C(=O)-N(aralkyl)₂ groups, substituted and
37 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
38 unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted
39 and unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted
40 and unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups,
41 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl)
42 groups, substituted and unsubstituted
43 -C(=O)-N(heterocyclylalkyl)₂ groups, -CO₂H, substituted and
44 unsubstituted -C(=O)-O-alkyl groups, substituted and
45 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted
46 and unsubstituted -C(=O)-O-heterocyclylalkyl groups;

47 R⁶ and R⁷ are independently selected from the group consisting
48 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
49 alkyl groups having from 1 to 12 carbon atoms, substituted and
50 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
51 substituted and unsubstituted heterocyclyl groups, substituted
52 and unsubstituted heterocyclylalkyl groups, -OH, substituted and
53 unsubstituted alkoxy groups, substituted and unsubstituted
54 heterocyclyoxy groups, and substituted and unsubstituted
55 heterocyclylalkoxy groups; or R⁶ is absent if B is nitrogen; or R⁷
56 is absent if C is nitrogen.

1 31. The method of claim 29, wherein R⁹ is selected from the
2 group consisting of -H, substituted and unsubstituted straight and branched
3 chain alkyl groups having from 1 to 8 carbon atoms, substituted and

4 unsubstituted cycloalkyl groups, substituted and unsubstituted heterocyclyl
5 groups, and substituted and unsubstituted heterocyclylalkyl groups.

1 32. The method of claim 29, wherein R¹ is selected from the
2 group consisting of -H, -F, -Cl, -Br, -I, substituted and unsubstituted straight
3 and branched chain alkyl groups having from 1 to 8 carbon atoms, substituted
4 and unsubstituted cycloalkyl groups, and substituted and unsubstituted
5 heterocyclyl groups.

1 33. The method of claim 29, wherein R² is selected from the
2 group consisting of -H, -F, -Cl, -Br, -I, -NO₂, -CN, substituted and
3 unsubstituted straight and branched chain alkyl groups having from 1 to 12
4 carbon atoms, substituted and unsubstituted cycloalkyl groups, substituted
5 and unsubstituted aryl groups, and substituted and unsubstituted aralkyl
6 groups.

1 34. The method of claim 29, wherein R³ is selected from the
2 group consisting of -H, -F, -Cl, -Br, -I, -CN, substituted and unsubstituted
3 straight or branched chain alkyl groups having from 1 to 8 carbon atoms,
4 substituted and unsubstituted cycloalkyl groups, substituted and unsubstituted
5 aryl groups, substituted and unsubstituted aralkyl groups, substituted and
6 unsubstituted heterocyclyl groups, substituted and unsubstituted
7 heterocyclylalkyl groups, -OH, substituted and unsubstituted alkoxy groups,
8 substituted and unsubstituted heterocyclyloxy groups, substituted and
9 unsubstituted heterocyclylalkoxy groups, substituted and unsubstituted
10 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂ groups, and
11 substituted and unsubstituted -N(H)(heterocyclylalkyl) groups.

1 35. The method of claim 29, R⁶ and R⁷ are independently
2 selected from the group consisting of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted
3 and unsubstituted straight or branched chain alkyl groups having from 1 to 8

4 carbon atoms, substituted and unsubstituted cycloalkyl groups, substituted
5 and unsubstituted heterocyclyl groups, substituted and unsubstituted
6 heterocyclylalkyl groups, -OH, substituted and unsubstituted alkoxy groups,
7 substituted and unsubstituted heterocyclloxy groups, and substituted and
8 unsubstituted heterocyclylalkoxy groups; or R⁶ is absent if B is nitrogen; or R⁷
9 is absent if C is nitrogen.

1 36. The method of any of claims 3, 8, 13, 24, or 29, wherein
2 R⁹ is selected from the group consisting of quinuclidinyl groups, piperidinyl
3 groups, piperidinylalkyl groups, pyrrolidinyl groups, and aminocyclohexyl
4 groups.

1 37. The method of any of claims 3 or 13, wherein A, B, C,
2 and D are all carbon, and R⁴, R⁵, R⁶, R⁷, R⁸, and R¹⁰ are all -H.

1 38. The method of any of claims 3, 8, 13, 24, or 29, wherein
2 the IC₅₀ value of the compound is less than or equal to 0.1 μM with respect to
3 the serine/threonine kinase.

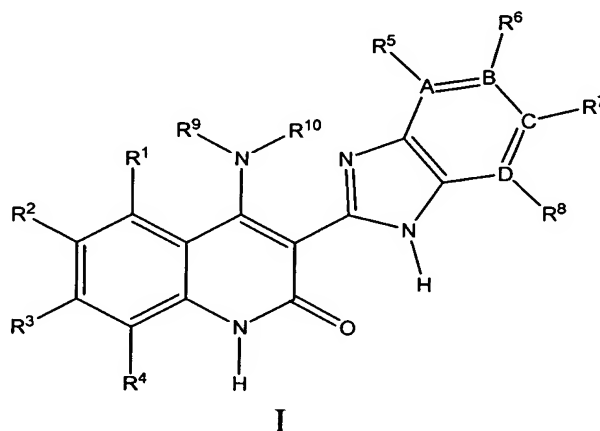
1 39. The method of any of claims 3, 8, 24, or 29, wherein the
2 biological condition is diabetes.

1 40. The method of any of claims 3, 8, 13, 24, or 29, wherein
2 the biological condition is Alzheimer's disease.

1 41. The method of claims 1, 3, 8, 13, 24, or 29, wherein
2 administration of the compound to the subject reduces tau phosphorylation.

1 42. A method of inhibiting a tyrosine kinase in a subject or
2 treating a biological condition mediated by the tyrosine kinase in a subject,
3 comprising: administering to the subject a compound of Structure I, a

4 tautomer of the compound, a pharmaceutically acceptable salt of the
5 compound, a pharmaceutically acceptable salt of the tautomer, or mixtures
6 thereof, wherein the tyrosine kinase is selected from the group consisting of
7 cell cycle division 2 kinase, Fyn, Lck, c-Kit, c-ABL, VEGFR3, PDGFR α ,
8 PDGFR β , FGFR3, FLT-3, p60src, and Tie-2 and Structure I has the following
9 formula



10

11

wherein,

12

A, B, C, and D are independently selected from the group
13 consisting of carbon and nitrogen;

13

14

R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
15 -CN, -NO₂, substituted and unsubstituted alkyl groups having
16 from 1 to 12 carbon atoms, substituted and unsubstituted
17 alkenyl groups having from 1 to 12 carbon atoms, substituted
18 and unsubstituted aryl groups, substituted and unsubstituted
19 aralkyl groups, substituted and unsubstituted heterocycl
20 groups, substituted and unsubstituted heterocyclalkyl groups,
21 -SH, substituted and unsubstituted -S-alkyl groups, substituted
22 and unsubstituted -S-heterocycl groups, -OH, substituted and
23 unsubstituted alkoxy groups, substituted and unsubstituted
24 heterocycloxy groups, substituted and unsubstituted

24

25 heterocyclalkoxy groups, -NH₂, substituted and unsubstituted
26 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
27 groups, substituted and unsubstituted -N(H)(heterocycl)
28 groups, substituted and unsubstituted -N(alkyl)(heterocycl)
29 groups, substituted and unsubstituted -N(heterocycl)₂ groups,
30 substituted and unsubstituted -N(H)(heterocyclalkyl) groups,
31 substituted and unsubstituted -N(alkyl)(heterocyclalkyl) groups,
32 substituted and unsubstituted -N(heterocyclalkyl)₂ groups,
33 substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
34 substituted and unsubstituted -N(H)-C(=O)-heterocycl groups,
35 substituted and unsubstituted -N(H)-C(=O)-heterocyclalkyl
36 groups, substituted and unsubstituted -N(alkyl)-S(=O)₂-alkyl
37 groups, substituted and unsubstituted
38 -N(alkyl)-S(=O)₂-heterocycl groups, substituted and
39 unsubstituted -N(alkyl)-S(=O)₂-heterocyclalkyl groups,
40 substituted and unsubstituted -C(=O)-alkyl groups, substituted
41 and unsubstituted -C(=O)-heterocycl groups, substituted and
42 unsubstituted -C(=O)-heterocyclalkyl groups, -C(=O)-NH₂,
43 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
44 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
45 substituted and unsubstituted -C(=O)-N(H)(heterocycl) groups,
46 substituted and unsubstituted -C(=O)-N(alkyl)(heterocycl)
47 groups, substituted and unsubstituted -C(=O)-N(heterocycl)₂
48 groups, substituted and unsubstituted
49 -C(=O)-N(H)(heterocyclalkyl) groups, substituted and
50 unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl) groups,
51 substituted and unsubstituted -C(=O)-N(heterocyclalkyl)₂
52 groups, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl
53 groups, substituted and unsubstituted -C(=O)-O-heterocycl
54 groups, and substituted and unsubstituted
55 -C(=O)-O-heterocyclalkyl groups;

56 R^2 and R^3 are independently selected from the group consisting
57 of -H, -F, -Cl, -Br, -I, -NO₂, -CN, substituted and unsubstituted
58 alkyl groups having from 1 to 12 carbon atoms, substituted and
59 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
60 substituted and unsubstituted aryl groups, substituted and
61 unsubstituted aralkyl groups, substituted and unsubstituted
62 heterocyclyl groups, substituted and unsubstituted
63 heterocyclylalkyl groups, -SH, substituted and unsubstituted -S-
64 alkyl groups, substituted and unsubstituted -S(=O)₂-O-alkyl
65 groups, substituted and unsubstituted -S(=O)₂-alkyl groups,
66 substituted and unsubstituted -S(=O)₂-heterocyclyl groups,
67 -S(=O)₂-NH₂, substituted and unsubstituted -S(=O)₂-N(H)(alkyl)
68 groups, substituted and unsubstituted -S(=O)₂-N(alkyl)₂ groups,
69 substituted and unsubstituted -S(=O)-alkyl groups, substituted
70 and unsubstituted -S(=O)-heterocyclyl groups, -OH, substituted
71 and unsubstituted alkoxy groups, substituted and unsubstituted
72 aryloxy groups, substituted and unsubstituted heterocyclyloxy
73 groups, substituted and unsubstituted heterocyclylalkoxy
74 groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups,
75 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
76 unsubstituted -N(H)(aryl) groups, substituted and unsubstituted
77 -N(alkyl)(aryl) groups, substituted and unsubstituted -N(aryl)₂
78 groups, substituted and unsubstituted -N(H)(aralkyl) groups,
79 substituted and unsubstituted -N(alkyl)(aralkyl) groups,
80 substituted and unsubstituted -N(aralkyl)₂ groups, substituted
81 and unsubstituted -N(H)(heterocyclyl) groups, substituted and
82 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
83 unsubstituted -N(heterocyclyl)₂ groups, substituted and
84 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
85 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
86 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
87 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and

88 unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
89 unsubstituted -N(H)-C(=O)-aryl groups, substituted and
90 unsubstituted -N(alkyl)-C(=O)-aryl groups, substituted and
91 unsubstituted -N(H)-C(=O)-aralkyl groups, substituted and
92 unsubstituted -N(alkyl)-C(=O)-aralkyl groups, substituted and
93 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
94 unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted
95 and unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups,
96 substituted and unsubstituted -N(alkyl)-C(=O)-heterocyclylalkyl
97 groups, substituted and unsubstituted -N(H)-S(=O)₂-alkyl
98 groups, substituted and unsubstituted -N(H)-S(=O)₂-aryl,
99 substituted and unsubstituted -N(H)-S(=O)₂-heterocyclyl groups,
100 substituted and unsubstituted -C(=O)-alkyl groups, substituted
101 and unsubstituted -C(=O)-aryl, substituted and unsubstituted
102 -C(=O)-aralkyl, substituted and unsubstituted
103 -C(=O)-heterocyclyl groups, substituted and unsubstituted
104 -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and
105 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
106 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
107 unsubstituted -C(=O)-N(H)(aryl) groups, substituted and
108 unsubstituted -C(=O)-N(alkyl)(aryl) groups, substituted and
109 unsubstituted -C(=O)-N(aryl)₂ groups, substituted and
110 unsubstituted -C(=O)-N(H)(aralkyl) groups, substituted and
111 unsubstituted -C(=O)-N(alkyl)(aralkyl) groups, substituted and
112 unsubstituted -C(=O)-N(aralkyl)₂ groups, substituted and
113 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
114 unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted
115 and unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted
116 and unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups,
117 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl)
118 groups, substituted and unsubstituted -
119 C(=O)-N(heterocyclylalkyl)₂ groups, -CO₂H, substituted and

120 unsubstituted -C(=O)-O-alkyl groups, C(=O)-O-aryl groups -
121 C(=O)-O-alkyl groups, substituted and unsubstituted
122 -C(=O)-O-heterocyclyl groups, and substituted and
123 unsubstituted -C(=O)-O-heterocyclalkyl groups;

124 R⁴ is selected from the group consisting of -H and substituted
125 and unsubstituted alkyl groups having from 1 to 12 carbon
126 atoms;

127 R⁵ and R⁸ are independently selected from the group consisting
128 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
129 alkyl groups having from 1 to 12 carbon atoms, substituted and
130 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
131 substituted and unsubstituted heterocyclyl groups, substituted
132 and unsubstituted heterocyclalkyl groups, -OH, substituted and
133 unsubstituted alkoxy groups, substituted and unsubstituted
134 heterocycloxy groups, substituted and unsubstituted
135 heterocyclalkoxy groups; or R⁵ may be absent if A is nitrogen;
136 or R⁸ may be absent if D is nitrogen;

137 R⁶ and R⁷ are independently selected from the group consisting
138 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
139 alkyl groups having from 1 to 12 carbon atoms, substituted and
140 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
141 substituted and unsubstituted aryl groups, substituted and
142 unsubstituted arylalkyl groups, substituted and unsubstituted
143 heterocyclyl groups, substituted and unsubstituted
144 heterocyclalkyl groups, -SH, substituted and unsubstituted
145 -S-alkyl groups, substituted and unsubstituted -S-heterocyclyl
146 groups, -S(=O)₂-NH₂, substituted and unsubstituted
147 -S(=O)₂-N(H)(alkyl) groups, substituted and unsubstituted

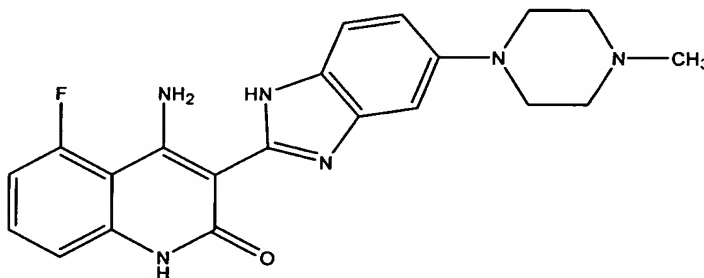
148 -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and unsubstituted
149 alkoxy groups, substituted and unsubstituted heterocycloxy
150 groups, substituted and unsubstituted heterocyclalkoxy
151 groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups,
152 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
153 unsubstituted -N(H)(heterocycl) groups, substituted and
154 unsubstituted -N(alkyl)(heterocycl) groups, substituted and
155 unsubstituted -N(heterocycl)₂ groups, substituted and
156 unsubstituted -N(H)(heterocyclalkyl) groups, substituted and
157 unsubstituted -N(alkyl)(heterocyclalkyl) groups, substituted and
158 unsubstituted -N(heterocyclalkyl)₂ groups, substituted and
159 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
160 unsubstituted -N(H)-C(=O)-heterocycl groups, substituted and
161 unsubstituted -N(H)-C(=O)-heterocyclalkyl groups, substituted
162 and unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
163 unsubstituted -N(alkyl)-C(=O)-heterocycl groups, substituted
164 and unsubstituted -N(alkyl)-C(=O)-heterocyclalkyl, substituted
165 and unsubstituted -N(H)-S(=O)₂-alkyl groups, substituted and
166 unsubstituted -N(H)-S(=O)₂-heterocycl groups, substituted and
167 unsubstituted -N(H)-S(=O)₂-heterocyclalkyl groups, substituted
168 and unsubstituted -C(=O)-alkyl groups, substituted and
169 unsubstituted -C(=O)-heterocycl groups, substituted and
170 unsubstituted -C(=O)-heterocyclalkyl groups, -C(=O)-NH₂,
171 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
172 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
173 substituted and unsubstituted -C(=O)-N(H)(heterocycl) groups,
174 substituted and unsubstituted -C(=O)-N(alkyl)(heterocycl)
175 groups, substituted and unsubstituted -C(=O)-N(heterocycl)₂
176 groups, substituted and unsubstituted
177 -C(=O)-N(H)(heterocyclalkyl) groups, substituted and
178 unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl) groups,
179 substituted and unsubstituted -C(=O)-N(heterocyclalkyl)₂

180 groups, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl
181 groups, substituted and unsubstituted -C(=O)-O-heterocyclyl
182 groups, and substituted and unsubstituted
183 -C(=O)-O-heterocyclalkyl groups; or R⁶ is absent if B is
184 nitrogen; or R⁷ is absent if C is nitrogen;

185 R⁹ is selected from the group consisting of -H, substituted and
186 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
187 substituted and unsubstituted alkenyl groups having from 1 to 12
188 carbons, substituted and unsubstituted aryl groups, substituted
189 and unsubstituted aralkyl groups, substituted and unsubstituted
190 heterocyclyl groups, substituted and unsubstituted
191 heterocyclalkyl groups, -OH, substituted and unsubstituted
192 alkoxy groups, substituted and unsubstituted heterocycloxy
193 groups, -NH₂, and substituted and unsubstituted
194 heterocyclaminoalkyl; and

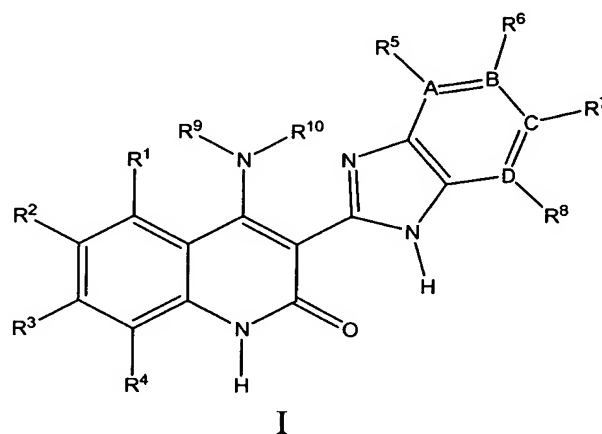
195 R¹⁰ is -H.

1 43. The method of claim 42, wherein the compound has the
2 following formula



1 44. A method of inhibiting a tyrosine kinase in a subject or
2 treating a biological condition mediated by the tyrosine kinase in a subject,
3 comprising: administering to the subject a compound of Structure I, a
4 tautomer of the compound, a pharmaceutically acceptable salt of the

5 compound, a pharmaceutically acceptable salt of the tautomer, or mixtures
6 thereof wherein the tyrosine kinase is cell cycle division 2 kinase, stem cell
7 factor receptor, stem cell tyrosine kinase I, and Structure I has the following
8 formula



9

10

wherein,

11

A, B, C, and D are independently selected from the group
12 consisting of carbon and nitrogen;

13

14

15

16

17

18

19

20

21

22

23

24

25

R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted alkyl groups having from 1 to 12 carbon atoms, substituted and unsubstituted alkenyl groups having from 1 to 12 carbon atoms, substituted and unsubstituted heterocyclyl groups, substituted and unsubstituted heterocyclylalkyl groups, -SH, substituted and unsubstituted -S-alkyl groups, substituted and unsubstituted -S-heterocyclyl groups, -OH, substituted and unsubstituted alkoxy groups, substituted and unsubstituted heterocycloxy groups, substituted and unsubstituted heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂ groups, substituted and unsubstituted -N(H)(heterocyclyl) groups, substituted and

26 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
27 unsubstituted -N(heterocyclyl)₂ groups, substituted and
28 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
29 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
30 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
31 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
32 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
33 unsubstituted -N(H)-C(=O)-heterocyclylalkyl groups, substituted
34 and unsubstituted -C(=O)-alkyl groups, substituted and
35 unsubstituted -C(=O)-heterocyclyl groups, substituted and
36 unsubstituted -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂,
37 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
38 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
39 substituted and unsubstituted -C(=O)-N(H)(heterocyclyl) groups,
40 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclyl)
41 groups, substituted and unsubstituted -C(=O)-N(heterocyclyl)₂
42 groups, substituted and unsubstituted
43 -C(=O)-N(H)(heterocyclylalkyl) groups, substituted and
44 unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl) groups,
45 substituted and unsubstituted -C(=O)-N(heterocyclylalkyl)₂
46 groups, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl
47 groups, substituted and unsubstituted -C(=O)-O-heterocyclyl
48 groups, and substituted and unsubstituted
49 -C(=O)-O-heterocyclylalkyl groups;

50 R² and R³ are independently selected from the group consisting
51 of -H, -F, -Cl, -Br, -I, -NO₂, -CN, substituted and unsubstituted
52 alkyl groups having from 1 to 12 carbon atoms, substituted and
53 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
54 substituted and unsubstituted aryl groups, substituted and
55 unsubstituted aralkyl groups, substituted and unsubstituted
56 heterocyclyl groups, substituted and unsubstituted

57 heterocyclalkyl groups, -SH, substituted and unsubstituted -S-
58 alkyl groups, substituted and unsubstituted -S(=O)₂-O-alkyl
59 groups, substituted and unsubstituted -S(=O)₂-alkyl groups,
60 substituted and unsubstituted -S(=O)₂-heterocyclalkyl groups,
61 -S(=O)₂-NH₂, substituted and unsubstituted -S(=O)₂-N(H)(alkyl)
62 groups, substituted and unsubstituted -S(=O)₂-N(alkyl)₂ groups,
63 substituted and unsubstituted -S(=O)-alkyl groups, substituted
64 and unsubstituted -S(=O)-heterocyclalkyl groups, -OH, substituted
65 and unsubstituted alkoxy groups, substituted and unsubstituted
66 aryloxy groups, substituted and unsubstituted heterocyclalkoxy
67 groups, substituted and unsubstituted heterocyclalkoxy
68 groups, -NH₂, substituted and unsubstituted -N(H)(alkyl) groups,
69 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
70 unsubstituted -N(H)(aryl) groups, substituted and unsubstituted
71 -N(alkyl)(aryl) groups, substituted and unsubstituted -N(aryl)₂
72 groups, substituted and unsubstituted -N(H)(aralkyl) groups,
73 substituted and unsubstituted -N(alkyl)(aralkyl) groups,
74 substituted and unsubstituted -N(aralkyl)₂ groups, substituted
75 and unsubstituted -N(H)(heterocyclalkyl) groups, substituted and
76 unsubstituted -N(alkyl)(heterocyclalkyl) groups, substituted and
77 unsubstituted -N(heterocyclalkyl)₂ groups, substituted and
78 unsubstituted -N(H)(heterocyclalkyl) groups, substituted and
79 unsubstituted -N(alkyl)(heterocyclalkyl) groups, substituted and
80 unsubstituted -N(heterocyclalkyl)₂ groups, substituted and
81 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
82 unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
83 unsubstituted -N(H)-C(=O)-aryl groups, substituted and
84 unsubstituted -N(alkyl)-C(=O)-aryl groups, substituted and
85 unsubstituted -N(H)-C(=O)-aralkyl groups, substituted and
86 unsubstituted -N(alkyl)-C(=O)-aralkyl groups, substituted and
87 unsubstituted -N(H)-C(=O)-heterocyclalkyl groups, substituted and
88 unsubstituted -N(alkyl)-C(=O)-heterocyclalkyl groups, substituted

89 and unsubstituted -N(H)-C(=O)-heterocyclalkyl groups,
90 substituted and unsubstituted -N(alkyl)-C(=O)-heterocyclalkyl
91 groups, substituted and unsubstituted -N(H)-S(=O)₂-alkyl
92 groups, substituted and unsubstituted -N(H)-S(=O)₂-aryl,
93 substituted and unsubstituted -N(H)-S(=O)₂-heterocycl groups,
94 substituted and unsubstituted -C(=O)-alkyl groups, substituted
95 and unsubstituted -C(=O)-aryl, substituted and unsubstituted
96 -C(=O)-aralkyl, substituted and unsubstituted
97 -C(=O)-heterocycl groups, substituted and unsubstituted
98 -C(=O)-heterocyclalkyl groups, -C(=O)-NH₂, substituted and
99 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
100 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
101 unsubstituted -C(=O)-N(H)(aryl) groups, substituted and
102 unsubstituted -C(=O)-N(alkyl)(aryl) groups, substituted and
103 unsubstituted -C(=O)-N(aryl)₂ groups, substituted and
104 unsubstituted -C(=O)-N(H)(aralkyl) groups, substituted and
105 unsubstituted -C(=O)-N(alkyl)(aralkyl) groups, substituted and
106 unsubstituted -C(=O)-N(aralkyl)₂ groups, substituted and
107 unsubstituted -C(=O)-N(H)(heterocycl) groups, substituted and
108 unsubstituted -C(=O)-N(alkyl)(heterocycl) groups, substituted
109 and unsubstituted -C(=O)-N(heterocycl)₂ groups, substituted
110 and unsubstituted -C(=O)-N(H)(heterocyclalkyl) groups,
111 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl)
112 groups, substituted and unsubstituted -
113 C(=O)-N(heterocyclalkyl)₂ groups, -CO₂H, substituted and
114 unsubstituted -C(=O)-O-alkyl groups, C(=O)-O-aryl groups -
115 C(=O)-O-aralkyl groups, substituted and unsubstituted
116 -C(=O)-O-heterocycl groups, and substituted and
117 unsubstituted -C(=O)-O-heterocyclalkyl groups;

118 R^4 is selected from the group consisting of -H and substituted
119 and unsubstituted alkyl groups having from 1 to 12 carbon
120 atoms;

121 R^5 and R^8 are independently selected from the group consisting
122 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
123 alkyl groups having from 1 to 12 carbon atoms, substituted and
124 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
125 substituted and unsubstituted heterocyclyl groups, substituted
126 and unsubstituted heterocyclylalkyl groups, -OH, substituted and
127 unsubstituted alkoxy groups, substituted and unsubstituted
128 heterocycloxy groups, and substituted and unsubstituted
129 heterocyclylalkoxy groups; or R^5 may be absent if A is nitrogen;
130 or R^8 may be absent if D is nitrogen;

131 R^6 and R^7 are independently selected from the group consisting
132 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
133 alkyl groups having from 1 to 12 carbon atoms, substituted and
134 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
135 substituted and unsubstituted heterocyclyl groups, substituted
136 and unsubstituted heterocyclylalkyl groups, -SH, substituted and
137 unsubstituted -S-alkyl groups, substituted and unsubstituted
138 -S-heterocyclyl groups, -S(=O)₂-NH₂, substituted and
139 unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
140 unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and
141 unsubstituted alkoxy groups, substituted and unsubstituted
142 heterocycloxy groups, substituted and unsubstituted
143 heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted
144 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
145 groups, substituted and unsubstituted -N(H)(heterocyclyl)
146 groups, substituted and unsubstituted -N(alkyl)(heterocyclyl)

147 groups, substituted and unsubstituted -N(heterocyclyl)₂ groups,
148 substituted and unsubstituted -N(H)(heterocyclylalkyl) groups,
149 substituted and unsubstituted -N(alkyl)(heterocyclylalkyl) groups,
150 substituted and unsubstituted -N(heterocyclylalkyl)₂ groups,
151 substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
152 substituted and unsubstituted -N(H)-C(=O)-heterocyclyl groups,
153 substituted and unsubstituted -N(H)-C(=O)-heterocyclylalkyl
154 groups, substituted and unsubstituted -C(=O)-alkyl groups,
155 substituted and unsubstituted -C(=O)-heterocyclyl groups,
156 substituted and unsubstituted -C(=O)-heterocyclylalkyl groups,
157 -C(=O)-NH₂, substituted and unsubstituted -C(=O)-N(H)(alkyl)
158 groups, substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
159 substituted and unsubstituted -C(=O)-N(H)(heterocyclyl) groups,
160 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclyl)
161 groups, substituted and unsubstituted -C(=O)-N(heterocyclyl)₂
162 groups, substituted and unsubstituted
163 -C(=O)-N(H)(heterocyclylalkyl) groups, substituted and
164 unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl) groups,
165 substituted and unsubstituted -C(=O)-N(heterocyclylalkyl)₂
166 groups, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl
167 groups, substituted and unsubstituted -C(=O)-O-heterocyclyl
168 groups, and substituted and unsubstituted
169 -C(=O)-O-heterocyclylalkyl groups; or R⁶ is absent if B is
170 nitrogen; or R⁷ is absent if C is nitrogen;

171 R⁹ is selected from the group consisting of -H, substituted and
172 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
173 substituted and unsubstituted alkenyl groups having from 1 to 12
174 carbons, substituted and unsubstituted aryl groups, substituted
175 and unsubstituted aralkyl groups, substituted and unsubstituted
176 heterocyclyl groups, substituted and unsubstituted

177 heterocyclylalkyl groups, -OH, substituted and unsubstituted
178 alkoxy groups, and -NH₂; and

179 R¹⁰ is -H.

1 45. The method of claim 44, wherein

2 R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
3 -CN, -NO₂, substituted and unsubstituted alkyl groups having
4 from 1 to 12 carbon atoms, substituted and unsubstituted
5 alkenyl groups having from 1 to 12 carbon atoms, substituted
6 and unsubstituted heterocyclyl groups, substituted and
7 unsubstituted heterocyclylalkyl groups, -OH, substituted and
8 unsubstituted alkoxy groups, substituted and unsubstituted
9 heterocyclyloxy groups, substituted and unsubstituted
10 heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted
11 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
12 groups, substituted and unsubstituted -N(H)(heterocyclyl)
13 groups, substituted and unsubstituted -N(alkyl)(heterocyclyl)
14 groups, substituted and unsubstituted -N(heterocyclyl)₂ groups,
15 substituted and unsubstituted -N(H)(heterocyclylalkyl) groups,
16 substituted and unsubstituted -N(alkyl)(heterocyclylalkyl) groups,
17 and substituted and unsubstituted -N(heterocyclylalkyl)₂ groups;

18 R² and R³ are independently selected from the group consisting
19 of -H, -F, -Cl, -Br, -I, -NO₂, -CN, substituted and unsubstituted
20 alkyl groups having from 1 to 12 carbon atoms, substituted and
21 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
22 substituted and unsubstituted aryl groups, substituted and
23 unsubstituted aralkyl groups, substituted and unsubstituted
24 heterocyclyl groups, substituted and unsubstituted

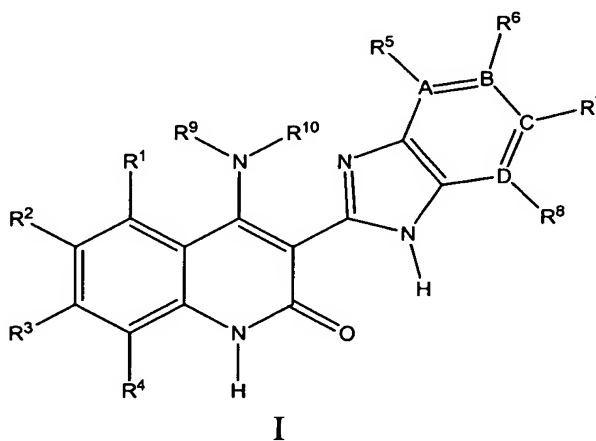
25 heterocyclylalkyl groups, -OH, substituted and unsubstituted
26 alkoxy groups, substituted and unsubstituted aryloxy groups,
27 substituted and unsubstituted heterocyclyloxy groups,
28 substituted and unsubstituted heterocyclylalkoxy groups, -NH₂,
29 substituted and unsubstituted -N(H)(alkyl) groups, substituted
30 and unsubstituted -N(alkyl)₂ groups, substituted and
31 unsubstituted -N(H)(aryl) groups, substituted and unsubstituted
32 -N(alkyl)(aryl) groups, substituted and unsubstituted -N(aryl)₂
33 groups, substituted and unsubstituted -N(H)(aralkyl) groups,
34 substituted and unsubstituted -N(alkyl)(aralkyl) groups,
35 substituted and unsubstituted -N(aralkyl)₂ groups, substituted
36 and unsubstituted -N(H)(heterocyclyl) groups, substituted and
37 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
38 unsubstituted -N(heterocyclyl)₂ groups, substituted and
39 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
40 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
41 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
42 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
43 -C(=O)-heterocyclyl groups, substituted and unsubstituted
44 -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and
45 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
46 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
47 unsubstituted -C(=O)-N(H)(aryl) groups, substituted and
48 unsubstituted -C(=O)-N(alkyl)(aryl) groups, substituted and
49 unsubstituted -C(=O)-N(aryl)₂ groups, substituted and
50 unsubstituted -C(=O)-N(H)(aralkyl) groups, substituted and
51 unsubstituted -C(=O)-N(alkyl)(aralkyl) groups, substituted and
52 unsubstituted -C(=O)-N(aralkyl)₂ groups, substituted and
53 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
54 unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted
55 and unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted
56 and unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups,

57 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl)
58 groups, substituted and unsubstituted
59 -C(=O)-N(heterocyclalkyl)₂ groups, -CO₂H, substituted and
60 unsubstituted -C(=O)-O-alkyl groups, substituted and
61 unsubstituted -C(=O)-O-heterocycl groups, and substituted
62 and unsubstituted -C(=O)-O-heterocyclalkyl groups;

63 R⁶ and R⁷ are independently selected from the group consisting
64 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
65 alkyl groups having from 1 to 12 carbon atoms, substituted and
66 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
67 substituted and unsubstituted heterocycl groups, substituted
68 and unsubstituted heterocyclalkyl groups, -S(=O)₂-NH₂,
69 substituted and unsubstituted -S(=O)₂-N(H)(alkyl) groups,
70 substituted and unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH,
71 substituted and unsubstituted alkoxy groups, substituted and
72 unsubstituted heterocycloxy groups, substituted and
73 unsubstituted heterocyclalkoxy groups, -NH₂, substituted and
74 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
75 -N(alkyl)₂ groups, substituted and unsubstituted
76 -N(H)(heterocycl) groups, substituted and unsubstituted
77 -N(alkyl)(heterocycl) groups, substituted and unsubstituted
78 -N(heterocycl)₂ groups, substituted and unsubstituted
79 -N(H)(heterocyclalkyl) groups, substituted and unsubstituted
80 -N(alkyl)(heterocyclalkyl) groups, substituted and unsubstituted
81 -N(heterocyclalkyl)₂ groups, substituted and unsubstituted
82 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
83 -N(H)-C(=O)-heterocycl groups, substituted and unsubstituted
84 -N(H)-C(=O)-heterocyclalkyl groups, substituted and
85 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
86 -C(=O)-heterocycl groups, substituted and unsubstituted
87 -C(=O)-heterocyclalkyl groups, -C(=O)-NH₂, substituted and

88 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
 89 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
 90 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
 91 unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted
 92 and unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted
 93 and unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups,
 94 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl)
 95 groups, substituted and unsubstituted
 96 -C(=O)-N(heterocyclylalkyl)₂ groups, -CO₂H, substituted and
 97 unsubstituted -C(=O)-O-alkyl groups, substituted and
 98 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted
 99 and unsubstituted -C(=O)-O-heterocyclylalkyl groups; or R⁶ is
 100 absent if B is nitrogen; or R⁷ is absent if C is nitrogen.

1 46. A method of inhibiting a tyrosine kinase in a subject or
 2 treating a biological condition mediated by the tyrosine kinase in a subject,
 3 comprising: administering to the subject a compound of Structure I, a
 4 tautomer of the compound, a pharmaceutically acceptable salt of the
 5 compound, a pharmaceutically acceptable salt of the tautomer, or mixtures
 6 thereof wherein the tyrosine kinase is the Fyn oncogene kinase related to
 7 SRC, FGR, YES and Structure I has the following formula



8

9

wherein,

10 A, B, C, and D are independently selected from the group
11 consisting of carbon and nitrogen;

12 R^1 and R^3 are independently selected from the group consisting
13 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, and substituted and
14 unsubstituted straight and branched chain alkyl groups having
15 from 1 to 8 carbon atoms;

16 R^2 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
17 -CN, -NO₂, substituted and unsubstituted alkyl groups having
18 from 1 to 12 carbon atoms, substituted and unsubstituted aryl
19 groups, and substituted and unsubstituted aralkyl groups;

20 R^4 is selected from the group consisting of -H and substituted
21 and unsubstituted straight and branched chain alkyl groups
22 having from 1 to 8 carbon atoms;

23 R^5 and R^8 are independently selected from the group consisting
24 of -H and substituted and unsubstituted straight and branched
25 chain alkyl groups having from 1 to 8 carbon atoms; or R^5 may
26 be absent if A is nitrogen; or R^8 may be absent if D is nitrogen;

27 R^6 and R^7 are independently selected from the group consisting
28 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
29 alkyl groups having from 1 to 12 carbon atoms, substituted and
30 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
31 substituted and unsubstituted heterocyclyl groups, substituted
32 and unsubstituted heterocyclylalkyl groups, -SH, substituted and
33 unsubstituted -S-alkyl groups, -OH, substituted and
34 unsubstituted alkoxy groups, substituted and unsubstituted
35 heterocycloxy groups, substituted and unsubstituted

36 heterocyclalkoxy groups, -NH₂, substituted and unsubstituted
37 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
38 groups, substituted and unsubstituted -N(H)(heterocycl)
39 groups, substituted and unsubstituted -N(alkyl)(heterocycl)
40 groups, substituted and unsubstituted -N(heterocycl)₂ groups,
41 substituted and unsubstituted -N(H)(heterocyclalkyl) groups,
42 substituted and unsubstituted -N(alkyl)(heterocyclalkyl) groups,
43 substituted and unsubstituted -N(heterocyclalkyl)₂ groups,
44 substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
45 substituted and unsubstituted -N(H)-C(=O)-heterocycl groups,
46 substituted and unsubstituted -N(H)-C(=O)-heterocyclalkyl,
47 substituted and unsubstituted -N(alkyl)-C(=O)-alkyl groups,
48 substituted and unsubstituted -N(alkyl)-C(=O)-heterocycl
49 groups, substituted and unsubstituted
50 -N(alkyl)-C(=O)-heterocyclalkyl, substituted and unsubstituted
51 -N(H)-S(=O)₂-alkyl groups, substituted and unsubstituted
52 -N(H)-S(=O)₂-heterocycl groups, substituted and unsubstituted
53 -N(H)-S(=O)₂-heterocyclalkyl groups, substituted and
54 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
55 -C(=O)-heterocycl groups, substituted and unsubstituted
56 -C(=O)-heterocyclalkyl groups, -C(=O)-NH₂, substituted and
57 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
58 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
59 unsubstituted -C(=O)-N(H)(heterocycl) groups, substituted and
60 unsubstituted -C(=O)-N(alkyl)(heterocycl) groups, substituted
61 and unsubstituted -C(=O)-N(H)(heterocyclalkyl) groups,
62 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl)
63 groups, -CO₂H, substituted and unsubstituted -C(=O)-O-alkyl
64 groups, substituted and unsubstituted -C(=O)-O-heterocycl
65 groups, and substituted and unsubstituted
66 -C(=O)-O-heterocyclalkyl groups; or R⁶ may be absent if B is
67 nitrogen; or R⁷ may be absent if C is nitrogen;

68 R⁹ is selected from the group consisting of -H, substituted and
69 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
70 substituted and unsubstituted alkenyl groups having from 1 to 12
71 carbon atoms, substituted and unsubstituted heterocyclyl
72 groups, substituted and unsubstituted heterocyclylalkyl groups,
73 substituted and unsubstituted alkoxy groups, substituted and
74 unsubstituted heterocyclyoxy groups, and substituted and
75 unsubstituted heterocyclylalkoxy; and

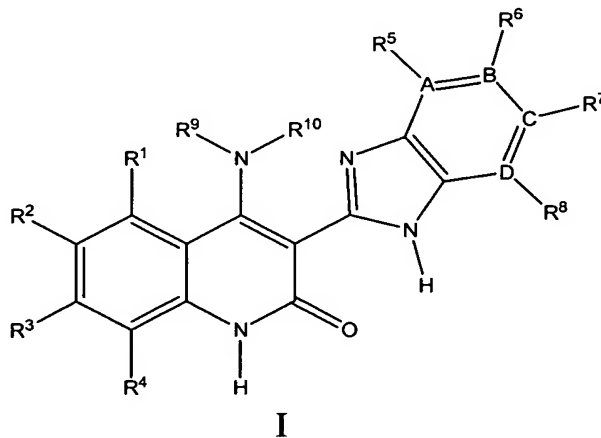
76 R¹⁰ is -H.

1 47. The method of claim 46, wherein

2 R⁶ and R⁷ are independently selected from the group consisting
3 of -H, -F, -Cl, -Br, -I, substituted and unsubstituted alkyl groups
4 having from 1 to 8 carbon atoms, substituted and unsubstituted
5 heterocyclyl groups, substituted and unsubstituted
6 heterocyclylalkyl groups, -OH, substituted and unsubstituted
7 alkoxy groups, substituted and unsubstituted heterocyclyoxy,
8 substituted and unsubstituted heterocyclylalkoxy, -NH₂,
9 substituted and unsubstituted -N(H)(alkyl) groups, substituted
10 and unsubstituted -N(alkyl)₂ groups, substituted and
11 unsubstituted -N(H)(heterocyclyl) groups, substituted and
12 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
13 unsubstituted -N(heterocyclyl)₂ groups, substituted and
14 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
15 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
16 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
17 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
18 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
19 unsubstituted -N(H)-C(=O)-heterocyclylalkyl, substituted and

unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -N(alkyl)-C(=O)-heterocyclylalkyl, -C(=O)-NH₂, substituted and unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups, and substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl) groups; or R⁶ may be absent if B is nitrogen; or R⁷ may be absent if C is nitrogen.

48. A method of inhibiting a tyrosine kinase in a subject or treating a biological condition mediated by the tyrosine kinase in a subject, comprising: administering to the subject a compound of Structure I, a tautomer of the compound, a pharmaceutically acceptable salt of the compound, a pharmaceutically acceptable salt of the tautomer, or mixtures thereof wherein the tyrosine kinase is Lck and Structure I has the following formula



wherein,

10 A, B, C, and D are independently selected from the group
11 consisting of carbon and nitrogen;

12 R^1 , R^2 , and R^3 are independently selected from the group
13 consisting of -H, -F, -Cl, -Br, -I, -CN, -NO₂, and substituted and
14 unsubstituted straight and branched chain alkyl groups having
15 from 1 to 8 carbon atoms;

16 R^4 is selected from the group consisting of -H and substituted
17 and unsubstituted straight and branched chain alkyl groups
18 having from 1 to 8 carbon atoms;

19 R^5 and R^8 are independently selected from the group consisting
20 of -H and substituted and unsubstituted straight and branched
21 chain alkyl groups having from 1 to 8 carbon atoms; or R^5 may
22 be absent if A is nitrogen; or R^8 may be absent if D is nitrogen;

23 R^6 and R^7 are independently selected from the group consisting
24 of -H, -F, -Cl, -Br, -I, -CN, -NO₂, substituted and unsubstituted
25 alkyl groups having from 1 to 12 carbon atoms, substituted and
26 unsubstituted alkenyl groups having from 1 to 12 carbon atoms,
27 substituted and unsubstituted heterocyclyl groups, substituted
28 and unsubstituted heterocyclylalkyl groups, -SH, substituted and
29 unsubstituted -S-alkyl groups, -OH, substituted and
30 unsubstituted alkoxy groups, substituted and unsubstituted
31 heterocycloxy groups, substituted and unsubstituted
32 heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted
33 -N(H)(alkyl) groups, substituted and unsubstituted -N(alkyl)₂
34 groups, substituted and unsubstituted -N(H)(heterocyclyl)
35 groups, substituted and unsubstituted -N(alkyl)(heterocyclyl)
36 groups, substituted and unsubstituted -N(heterocyclyl)₂ groups,

37 substituted and unsubstituted -N(H)(heterocyclalkyl) groups,
38 substituted and unsubstituted -N(alkyl)(heterocyclalkyl) groups,
39 substituted and unsubstituted -N(heterocyclalkyl)₂ groups,
40 substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
41 substituted and unsubstituted -N(H)-C(=O)-heterocycl groups,
42 substituted and unsubstituted -N(H)-C(=O)-heterocyclalkyl,
43 substituted and unsubstituted -N(alkyl)-C(=O)-alkyl groups,
44 substituted and unsubstituted -N(alkyl)-C(=O)-heterocycl
45 groups, substituted and unsubstituted
46 -N(alkyl)-C(=O)-heterocyclalkyl, substituted and unsubstituted
47 -N(H)-S(=O)₂-alkyl groups, substituted and unsubstituted
48 -N(H)-S(=O)₂-heterocycl groups, substituted and unsubstituted
49 -N(H)-S(=O)₂-heterocyclalkyl groups, substituted and
50 unsubstituted -N(alkyl)-S(=O)₂-alkyl groups, substituted and
51 unsubstituted -N(alkyl)-S(=O)₂-heterocycl groups, substituted
52 and unsubstituted -N(alkyl)-S(=O)₂-heterocyclalkyl groups,
53 substituted and unsubstituted -C(=O)-alkyl groups, substituted
54 and unsubstituted -C(=O)-heterocycl groups, substituted and
55 unsubstituted -C(=O)-heterocyclalkyl groups, -C(=O)-NH₂,
56 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
57 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
58 substituted and unsubstituted -C(=O)-N(H)(heterocycl) groups,
59 substituted and unsubstituted -C(=O)-N(alkyl)(heterocycl)
60 groups, substituted and unsubstituted
61 -C(=O)-N(H)(heterocyclalkyl) groups, substituted and
62 unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl) groups, -CO₂H,
63 substituted and unsubstituted -C(=O)-O-alkyl groups, substituted
64 and unsubstituted -C(=O)-O-heterocycl groups, and
65 substituted and unsubstituted -C(=O)-O-heterocyclalkyl
66 groups; or R⁶ may be absent if B is nitrogen; or R⁷ may be
67 absent if C is nitrogen;

68 R⁹ is selected from the group consisting of -H, substituted and
69 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
70 substituted and unsubstituted alkenyl groups having from 1 to 12
71 carbon atoms, substituted and unsubstituted heterocyclyl
72 groups, substituted and unsubstituted heterocyclylalkyl groups,
73 substituted and unsubstituted alkoxy groups, and substituted
74 and unsubstituted heterocycloxy groups; and

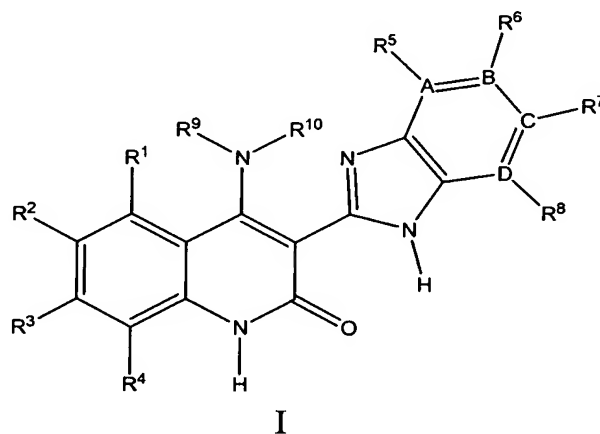
75 R¹⁰ is -H.

1 49. The method of claim 48, wherein

2 R⁶ and R⁷ are independently selected from the group consisting
3 of -H, -F, -Cl, -Br, -I, substituted and unsubstituted alkyl groups
4 having from 1 to 8 carbon atoms, substituted and unsubstituted
5 heterocyclyl groups, substituted and unsubstituted
6 heterocyclylalkyl groups, -OH, substituted and unsubstituted
7 alkoxy groups, substituted and unsubstituted heterocycloxy,
8 substituted and unsubstituted heterocyclylalkoxy, -NH₂,
9 substituted and unsubstituted -N(H)(alkyl) groups, substituted
10 and unsubstituted -N(alkyl)₂ groups, substituted and
11 unsubstituted -N(H)(heterocyclyl) groups, substituted and
12 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
13 unsubstituted -N(heterocyclyl)₂ groups, substituted and
14 unsubstituted -N(H)(heterocyclylalkyl) groups, substituted and
15 unsubstituted -N(alkyl)(heterocyclylalkyl) groups, substituted and
16 unsubstituted -N(heterocyclylalkyl)₂ groups, substituted and
17 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
18 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
19 unsubstituted -N(H)-C(=O)-heterocyclylalkyl, substituted and
20 unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and

unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted and unsubstituted -N(alkyl)-C(=O)-heterocyclalkyl, -C(=O)-NH₂, substituted and unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted and unsubstituted -C(=O)-N(H)(heterocyclalkyl) groups, and substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclalkyl) groups; or R⁶ may be absent if B is nitrogen; or R⁷ may be absent if C is nitrogen.

50. A method of inhibiting a tyrosine kinase in a subject or treating a biological condition mediated by the tyrosine kinase in a subject, comprising: administering to the subject a compound of Structure I, a tautomer of the compound, a pharmaceutically acceptable salt of the compound, a pharmaceutically acceptable salt of the tautomer, or mixtures thereof wherein the tyrosine kinase is Tie-2 and Structure I has the following formula



wherein,

A, B, C, and D are independently selected from the group consisting of carbon and nitrogen;

12 R^1 is selected from the group consisting of -H, -F, -Cl, -Br, -I,
13 -CN, -NO₂, substituted and unsubstituted alkyl groups having
14 from 1 to 12 carbon atoms, substituted and unsubstituted
15 alkenyl groups having from 1 to 12 carbon atoms, substituted
16 and unsubstituted aryl groups, substituted and unsubstituted
17 aralkyl groups, substituted and unsubstituted heterocyclyl
18 groups, substituted and unsubstituted heterocyclylalkyl groups,
19 -SH, substituted and unsubstituted -S-alkyl groups, -OH,
20 substituted and unsubstituted alkoxy groups, substituted and
21 unsubstituted heterocyclyoxy groups, substituted and
22 unsubstituted heterocyclylalkoxy groups, -NH₂, substituted and
23 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
24 -N(alkyl)₂ groups, substituted and unsubstituted
25 -N(H)(heterocyclyl) groups, substituted and unsubstituted
26 -N(alkyl)(heterocyclyl) groups, substituted and unsubstituted
27 -N(alkyl)(heterocyclylalkyl) groups, substituted and unsubstituted
28 -N(heterocyclyl)₂ groups, substituted and unsubstituted
29 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
30 -N(H)-S(=O)₂-alkyl groups, substituted and unsubstituted
31 -C(=O)-alkyl groups, substituted and unsubstituted
32 -C(=O)-heterocyclylalkyl groups, -C(=O)-NH₂, substituted and
33 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
34 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
35 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
36 unsubstituted -C(=O)-N(alkyl)(heterocyclyl) groups, substituted
37 and unsubstituted -C(=O)-N(heterocyclyl)₂ groups, substituted
38 and unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups,
39 substituted and unsubstituted -C(=O)-N(alkyl)(heterocyclylalkyl)
40 groups, substituted and unsubstituted
41 -C(=O)-N(heterocyclylalkyl)₂ groups, -CO₂H, substituted and
42 unsubstituted -C(=O)-O-alkyl groups, substituted and

43 unsubstituted -C(=O)-O-heterocyclyl groups, and substituted
44 and unsubstituted -C(=O)-O-heterocyclylalkyl groups;

45 R² is selected from the group consisting of -H, -F, -Cl, -Br, -I,
46 -CN, -NO₂, substituted and unsubstituted alkyl groups having
47 from 1 to 12 carbon atoms, substituted and unsubstituted
48 alkenyl groups having from 1 to 12 carbon atoms, substituted
49 and unsubstituted aryl groups, substituted and unsubstituted
50 aralkyl groups, substituted and unsubstituted heterocyclyl
51 groups, substituted and unsubstituted heterocyclylalkyl groups,
52 -OH, substituted and unsubstituted alkoxy groups, substituted
53 and unsubstituted heterocyclyloxy groups, substituted and
54 unsubstituted heterocyclylalkoxy groups, -SH, substituted and
55 unsubstituted -S-alkyl groups, -CO₂H, -C(=O)-NH₂, substituted
56 and unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
57 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
58 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
59 unsubstituted -C(=O)-N(H)(heterocyclylalkyl) groups, substituted
60 and unsubstituted -C(=O)-O-alkyl groups, substituted and
61 unsubstituted -C(=O)-O-heterocyclyl groups, substituted and
62 unsubstituted -C(=O)-O-heterocyclylalkyl groups, substituted
63 and unsubstituted -C(=O)-alkyl groups, substituted and
64 unsubstituted -C(=O)-heterocyclylalkyl groups, -NH₂, substituted
65 and unsubstituted -N(H)(alkyl) groups, substituted and
66 unsubstituted -N(H)(aryl) groups, substituted and unsubstituted
67 -N(H)(heterocyclyl) groups, substituted and unsubstituted
68 -N(alkyl)(heterocyclyl) groups, substituted and unsubstituted
69 -N(alkyl)(heterocyclylalkyl) groups, substituted and unsubstituted
70 -N(alkyl)₂ groups, substituted and unsubstituted
71 -N(heterocyclyl)₂ groups, substituted and unsubstituted
72 -N(H)-C(=O)-alkyl groups, and substituted and unsubstituted

- 73 -N(H)-S(=O)-alkyl groups; or R² and R³ may join together to form
74 a cyclic group;
- 75 R³ and R⁴ are independently selected from the group consisting
76 of -H and substituted and unsubstituted straight and branched
77 chain alkyl groups having from 1 to 8 carbon atoms;
- 78 R⁵ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
79 and substituted and unsubstituted straight and branched chain
80 alkyl groups having from 1 to 8 carbon atoms; or R⁵ may be
81 absent if A is nitrogen;
- 82 R⁶ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
83 -CN, -NO₂, substituted and unsubstituted alkyl groups having
84 from 1 to 12 carbon atoms, substituted and unsubstituted
85 alkenyl groups having from 1 to 12 carbon atoms, substituted
86 and unsubstituted aryl groups, substituted and unsubstituted
87 aralkyl groups, substituted and unsubstituted heterocyclyl
88 groups, substituted and unsubstituted heterocyclylalkyl groups,
89 -SH, substituted and unsubstituted -S-alkyl groups, substituted
90 and unsubstituted -S(=O)₂-O-alkyl groups, substituted and
91 unsubstituted -S(=O)₂-alkyl groups, substituted and
92 unsubstituted -S(=O)₂-heterocyclyl groups, substituted and
93 unsubstituted -S(=O)-alkyl groups, substituted and unsubstituted
94 -S(=O)-heterocyclyl groups, -S(=O)₂-NH₂, substituted and
95 unsubstituted -S(=O)₂-N(H)(alkyl) groups, substituted and
96 unsubstituted -S(=O)₂-N(alkyl)₂ groups, -OH, substituted and
97 unsubstituted alkoxy groups, substituted and unsubstituted
98 heterocycloxy groups, substituted and unsubstituted
99 heterocyclylalkoxy groups, -NH₂, substituted and unsubstituted
100 -N(H)(alkyl) groups, substituted and unsubstituted -N(H)(aryl)

101 groups, substituted and unsubstituted -N(H)(heterocyclyl)
102 groups, substituted and unsubstituted -N(alkyl)(heterocyclyl)
103 groups, substituted and unsubstituted -N(alkyl)(heterocyclylalkyl)
104 groups, substituted and unsubstituted -N(alkyl)₂ groups,
105 substituted and unsubstituted -N(heterocyclyl)₂ groups,
106 substituted and unsubstituted -N(H)-C(=O)-alkyl groups,
107 substituted and unsubstituted -N(H)-C(=O)-heterocyclyl groups,
108 substituted and unsubstituted -N(alkyl)-C(=O)-alkyl groups,
109 substituted and unsubstituted -N(alkyl)-C(=O)-heterocyclyl
110 groups, substituted and unsubstituted -N(H)-S(=O)-alkyl groups,
111 substituted and unsubstituted -N(H)-S(=O)-heterocyclyl groups,
112 substituted and unsubstituted -N(alkyl)-S(=O)-alkyl groups, and
113 substituted and unsubstituted -N(alkyl)-S(=O)-heterocyclyl
114 groups, substituted and unsubstituted -C(=O)-alkyl groups,
115 substituted and unsubstituted -C(=O)-heterocyclylalkyl groups
116 -C(=O)-NH₂, substituted and unsubstituted -C(=O)-N(H)(alkyl)
117 groups, substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
118 substituted and unsubstituted -C(=O)-N(H)(heterocyclyl) groups,
119 -C(=O)-N(H)(heterocyclylalkyl) groups, -CO₂H, substituted and
120 unsubstituted -C(=O)-O-alkyl groups, substituted and
121 unsubstituted -C(=O)-O-heterocyclyl groups, substituted and
122 unsubstituted -C(=O)-O-heterocyclylalkyl groups; or R⁶ may be
123 absent if B is nitrogen;

124 R⁷ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
125 -CN, -NO₂, substituted and unsubstituted alkyl groups having
126 from 1 to 12 carbon atoms, substituted and unsubstituted
127 alkenyl groups having from 1 to 12 carbon atoms, substituted
128 and unsubstituted aryl groups, substituted and unsubstituted
129 aralkyl groups, substituted and unsubstituted heterocyclyl
130 groups, substituted and unsubstituted heterocyclylalkyl groups,
131 -SH, substituted and unsubstituted -S-alkyl groups, -OH,

132 substituted and unsubstituted alkoxy groups, substituted and
133 unsubstituted heterocycloxy groups, substituted and
134 unsubstituted heterocyclalkoxy groups, -NH₂, substituted and
135 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
136 -N(H)(aryl) groups, substituted and unsubstituted
137 -N(H)(heterocycl) groups, substituted and unsubstituted
138 -N(alkyl)(heterocycl) groups, substituted and unsubstituted
139 -N(alkyl)(heterocyclalkyl) groups, substituted and unsubstituted
140 -N(alkyl)₂ groups, substituted and unsubstituted
141 -N(heterocycl)₂ groups, substituted and unsubstituted
142 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
143 -N(H)-S(=O)₂-alkyl groups, substituted and unsubstituted
144 -C(=O)-alkyl groups, substituted and unsubstituted
145 -C(=O)-heterocyclalkyl groups -C(=O)-NH₂, substituted and
146 unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
147 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
148 unsubstituted -C(=O)-N(H)(heterocycl) groups,
149 -C(=O)-N(H)(heterocyclalkyl) groups, -CO₂H, substituted and
150 unsubstituted -C(=O)-O-alkyl groups, substituted and
151 unsubstituted -C(=O)-O-heterocycl groups, and substituted
152 and unsubstituted -C(=O)-O-heterocyclalkyl groups; or R⁷ may
153 be absent if C is nitrogen;

154 R⁸ is selected from the group consisting of -H, substituted and
155 unsubstituted alkyl groups having from 1 to 12 carbon atoms; or
156 R⁸ may be absent if D is nitrogen;

157 R⁹ is selected from the group consisting of -H, substituted and
158 unsubstituted alkyl groups having from 1 to 12 carbon atoms,
159 substituted and unsubstituted alkenyl groups having from 1 to 12
160 carbon atoms, substituted and unsubstituted aryl groups,

161 substituted and unsubstituted aralkyl groups, substituted and
162 unsubstituted heterocyclyl groups, substituted and unsubstituted
163 heterocyclylalkyl groups, substituted and unsubstituted alkoxy
164 groups, substituted and unsubstituted heterocycloxy groups,
165 -NH₂, and substituted and unsubstituted heterocyclaminoalkyl;
166 or R⁹ and R¹⁰ join together to form a ring having 5, 6, or 7 ring
167 members; and

168 R¹⁰ is -H.

1 51. The method of claim 50, wherein

2 R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
3 substituted and unsubstituted alkyl groups having from 1 to 12
4 carbon atoms, substituted and unsubstituted heterocyclyl
5 groups, substituted and unsubstituted heterocyclalkyl groups,
6 -OH, substituted and unsubstituted alkoxy groups, substituted
7 and unsubstituted heterocycloxy groups, and substituted and
8 unsubstituted heterocyclalkoxy groups;

9 R² is selected from the group consisting of -H, -F, -Cl, -Br, -I,
10 substituted and unsubstituted alkyl groups having from 1 to 12
11 carbon atoms, substituted and unsubstituted cycloalkenyl
12 groups, substituted and unsubstituted aryl groups, substituted
13 and unsubstituted heterocyclyl groups, -OH, substituted and
14 unsubstituted alkoxy groups, substituted and unsubstituted
15 heterocycloxy groups, substituted and unsubstituted
16 heterocyclalkoxy groups;

17 R⁶ is selected from the group consisting of -H, substituted and
18 unsubstituted alkyl groups having from 1 to 8 carbon atoms,

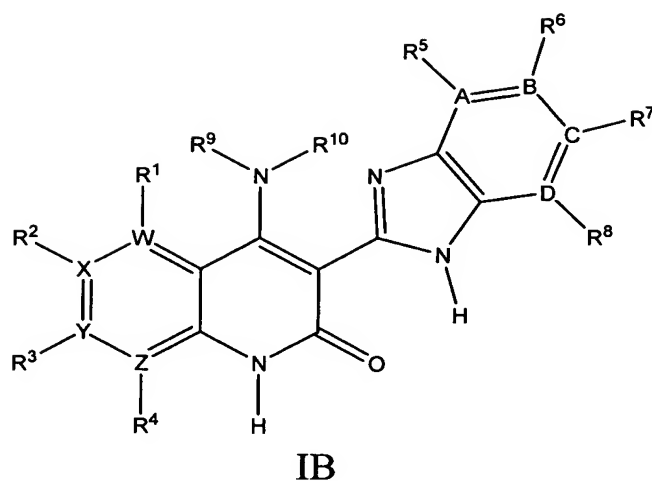
19 substituted and unsubstituted heterocyclyl groups, -OH,
20 substituted and unsubstituted alkoxy groups, substituted and
21 unsubstituted heterocycloxy, substituted and unsubstituted
22 heterocyclalkoxy, substituted and unsubstituted -N(H)(alkyl)
23 groups, substituted and unsubstituted -N(H)(heterocyclyl)
24 groups, and substituted and unsubstituted -N(alkyl)(heterocyclyl)
25 groups; or R⁶ may be absent if B is nitrogen;

26 R⁷ is selected from the group consisting of -H, -Cl, -F, -Br,
27 substituted and unsubstituted alkyl groups having from 1 to 8
28 carbon atoms, -OH, substituted and unsubstituted alkoxy
29 groups, substituted and unsubstituted heterocyclyl groups,
30 substituted and unsubstituted -N(H)(alkyl) groups, substituted
31 and unsubstituted -N(H)(heterocyclyl) groups, and substituted
32 and unsubstituted -N(alkyl)(heterocyclyl) groups,; or R⁷ may be
33 absent if C is nitrogen.

1 52. The method of any of claims 44, 46, 48, or 50, wherein
2 the IC₅₀ value of the compound is less than or equal to 0.1 μM with respect to
3 the tyrosine kinase.

1 53. The method of any of claims 46 or 48, wherein the
2 biological condition is an autoimmune disease.

1 54. A method of inhibiting a serine/threonine kinase in a
2 subject or treating a condition mediated by a serine/threonine kinase in a
3 subject, comprising: administering to the subject a compound of Structure IB,
4 a tautomer of the compound, a pharmaceutically acceptable salt of the
5 compound, a pharmaceutically acceptable salt of the tautomer, or mixtures
6 thereof wherein Structure IB has the following formula



wherein,

A, B, C, and D are independently selected from the group consisting of carbon and nitrogen;

W, X, Y, and Z are independently selected from the group consisting of carbon and nitrogen and at least one of W, X, Y, and Z is a nitrogen;

R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I, substituted and unsubstituted straight and branched chain alkyl groups having from 1 to 8 carbon atoms, substituted and unsubstituted alkenyl groups having from 1 to 8 carbon atoms, substituted and unsubstituted alkynyl groups having from 1 to 8 carbon atoms, -CN, -NO₂, -OH, -SH, substituted and unsubstituted alkoxy groups, substituted and unsubstituted -S-alkyl groups, substituted and unsubstituted -S(=O)₂-O-alkyl groups, substituted and unsubstituted -S(=O)₂-alkyl groups, substituted and unsubstituted -S(=O)-alkyl groups, -S(=O)-NH₂, substituted and unsubstituted -S(=O)-N(H)(alkyl) groups, substituted and unsubstituted -S(=O)-N(alkyl)₂ groups, -C(=O)-NH₂, substituted and unsubstituted -C(=O)-N(H)(alkyl)

27 groups, substituted and unsubstituted -C(=O)-N(alkyl)_2 groups,
28 substituted and unsubstituted -C(=O)-O-alkyl groups, -NH_2 ,
29 substituted and unsubstituted -N(H)(alkyl) groups, substituted
30 and unsubstituted -N(alkyl)_2 groups, substituted and
31 unsubstituted -N(H)-C(=O)-alkyl groups, and substituted and
32 unsubstituted -N(H)-S(=O)-alkyl groups; or R^1 may be absent if
33 W is nitrogen;

34 R^2 is selected from the group consisting of -H , -F , -Cl , -Br , -I ,
35 -NO_2 , -CN , -NH_2 , $\text{-CO}_2\text{H}$, -OH , substituted and unsubstituted
36 straight and branched chain alkyl groups having from 1 to 8
37 carbon atoms, substituted and unsubstituted cycloalkenyl
38 groups, substituted and unsubstituted cycloalkyl groups,
39 substituted and unsubstituted alkoxy groups, substituted and
40 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
41 -N(alkyl)_2 groups, substituted and unsubstituted heterocyclyl
42 groups, substituted and unsubstituted aryl groups, substituted
43 and unsubstituted alkenyl groups having from 1 to 8 carbon
44 atoms, substituted and unsubstituted alkynyl groups having from
45 1 to 8 carbon atoms, -SH , substituted and unsubstituted -S-alkyl
46 groups, substituted and unsubstituted $\text{-S(=O)}_2\text{-O-alkyl}$ groups,
47 substituted and unsubstituted $\text{-S(=O)}_2\text{-alkyl}$ groups, substituted
48 and unsubstituted $\text{-S(=O)}_2\text{-heterocyclyl}$ groups, substituted and
49 unsubstituted -S(=O)-alkyl groups, substituted and unsubstituted
50 $\text{-S(=O)-heterocyclyl}$ groups, -S(=O)-NH_2 , substituted and
51 unsubstituted $\text{-S(=O)-N(H)(alkyl)}$ groups, substituted and
52 unsubstituted -S(=O)-N(alkyl)_2 groups, -C(=O)-NH_2 , substituted
53 and unsubstituted $\text{-C(=O)-N(H)(alkyl)}$ groups, substituted and
54 unsubstituted -C(=O)-N(alkyl)_2 groups, substituted and
55 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
56 $\text{-C(=O)-heterocyclyl}$ groups, substituted and unsubstituted
57 -C(=O)-O-alkyl groups, substituted and unsubstituted

58 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
59 -N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
60 -N(H)-S(=O)-alkyl groups, substituted and unsubstituted
61 -N(H)-S(=O)-heterocyclyl groups, -N(alkyl)-C(=O)-alkyl groups,
62 substituted and unsubstituted -N(alkyl)-C(=O)-heterocyclyl
63 groups, substituted and unsubstituted -N(alkyl)-S(=O)-alkyl
64 groups, substituted and unsubstituted
65 -N(alkyl)-S(=O)-heterocyclyl groups, -N(H)-C(=O)-NH₂,
66 substituted and unsubstituted -N(H)-C(=O)-N(H)(alkyl) groups,
67 substituted and unsubstituted -N(H)-C(=O)-N(alkyl)₂ groups,
68 -N(alkyl)-C(=O)-NH₂, substituted and unsubstituted
69 -N(alkyl)-C(=O)-N(H)(alkyl) groups, and substituted and
70 unsubstituted -N(alkyl)-C(=O)-N(alkyl)₂ groups; or R² and R³
71 may join together to form a cyclic group when X and Y are both
72 carbon; or R² may be absent if X is nitrogen;

73 R³ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
74 -OH, substituted and unsubstituted straight and branched chain
75 alkyl groups having from 1 to 8 carbon atoms, substituted and
76 unsubstituted alkoxy groups, -CO₂H, -CN, substituted and
77 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
78 -N(H)(cycloalkyl) groups, substituted and unsubstituted
79 -N(alkyl)₂ groups, substituted and unsubstituted heterocyclyl
80 groups, substituted and unsubstituted aryl groups, substituted
81 and unsubstituted -C(=O)-heterocyclyl groups, substituted and
82 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
83 -C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
84 -C(=O)-N(alkyl)₂ groups, -C(=O)-NH₂ groups, substituted and
85 unsubstituted -C(=O)-N(H)(heterocyclyl) groups, substituted and
86 unsubstituted -C(=O)-N(H)(aryl) groups, substituted and
87 unsubstituted alkenyl groups having from 1 to 8 carbon atoms,
88 substituted and unsubstituted alkynyl groups having from 1 to 8

89 carbon atoms, -NO₂, -SH, substituted and unsubstituted -S-alkyl
90 groups, substituted and unsubstituted -S(=O)₂-O-alkyl groups,
91 substituted and unsubstituted -S(=O)₂-alkyl groups, substituted
92 and unsubstituted -S(=O)₂-heterocyclyl groups, substituted and
93 unsubstituted -S(=O)-alkyl groups, substituted and unsubstituted
94 -S(=O)-heterocyclyl groups, -S(=O)-NH₂, substituted and
95 unsubstituted -S(=O)-N(H)(alkyl) groups, substituted and
96 unsubstituted -S(=O)-N(alkyl)₂ groups, substituted and
97 unsubstituted -C(=O)-O-alkyl groups, -NH₂, substituted and
98 unsubstituted -N(H)-C(=O)-alkyl groups, substituted and
99 unsubstituted -N(H)-C(=O)-heterocyclyl groups, substituted and
100 unsubstituted -N(H)-S(=O)-alkyl groups, substituted and
101 unsubstituted -N(H)-S(=O)-heterocyclyl groups, substituted and
102 unsubstituted -N(alkyl)-C(=O)-alkyl groups, substituted and
103 unsubstituted -N(alkyl)-C(=O)-heterocyclyl groups, substituted
104 and unsubstituted -N(alkyl)-S(=O)-alkyl groups, substituted and
105 unsubstituted -N(alkyl)-S(=O)-heterocyclyl groups,
106 -N(H)-C(=O)-NH₂, substituted and unsubstituted
107 -N(H)-C(=O)-N(H)(alkyl) groups, substituted and unsubstituted
108 -N(H)-C(=O)-N(alkyl)₂ groups, -N(alkyl)-C(=O)-NH₂, substituted
109 and unsubstituted -N(alkyl)-C(=O)-N(H)(alkyl) groups, and
110 substituted and unsubstituted -N(alkyl)-C(=O)-N(alkyl)₂ groups;
111 or R² and R³ may join together to form a cyclic group when X
112 and Y are both carbon; or R³ may be absent if Y is nitrogen;

113 R⁴ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
114 substituted and unsubstituted straight and branched chain alkyl
115 groups having from 1 to 8 carbon atoms, substituted and
116 unsubstituted alkenyl groups having from 1 to 8 carbon atoms,
117 substituted and unsubstituted alkynyl groups having from 1 to 8
118 carbon atoms, -CN, -NO₂, -OH, -SH, substituted and
119 unsubstituted alkoxy groups, substituted and unsubstituted -S-

120 alkyl groups, substituted and unsubstituted $-S(=O)_2-O$ -alkyl
121 groups, substituted and unsubstituted $-S(=O)_2$ -alkyl groups,
122 substituted and unsubstituted $-S(=O)$ -alkyl groups, $-S(=O)-NH_2$,
123 substituted and unsubstituted $-S(=O)-N(H)(alkyl)$ groups,
124 substituted and unsubstituted $-S(=O)-N(alkyl)_2$ groups,
125 $-C(=O)-NH_2$, substituted and unsubstituted $-C(=O)-N(H)(alkyl)$
126 groups, substituted and unsubstituted $-C(=O)-N(alkyl)_2$ groups,
127 substituted and unsubstituted $-C(=O)-O$ -alkyl groups, $-NH_2$,
128 substituted and unsubstituted $-N(H)(alkyl)$ groups, substituted
129 and unsubstituted $-N(alkyl)_2$ groups, substituted and
130 unsubstituted $-N(H)-C(=O)$ -alkyl groups, and substituted and
131 unsubstituted $-N(H)-S(=O)$ -alkyl groups; or R^4 may be absent if
132 Z is nitrogen

133 R^5 is selected from the group consisting of $-H$, $-F$, $-Cl$, $-Br$, $-I$,
134 substituted and unsubstituted straight and branched chain alkyl
135 groups having from 1 to 8 carbon atoms, substituted and
136 unsubstituted heterocyclcyl groups, substituted and unsubstituted
137 alkenyl groups having from 1 to 8 carbon atoms, substituted and
138 unsubstituted alkynyl groups having from 1 to 8 carbon atoms,
139 $-CN$, $-NO_2$, $-OH$, $-SH$, substituted and unsubstituted alkoxy
140 groups, substituted and unsubstituted $-S$ -alkyl groups,
141 substituted and unsubstituted $-S(=O)_2-O$ -alkyl groups,
142 substituted and unsubstituted $-S(=O)_2$ -alkyl groups, substituted
143 and unsubstituted $-S(=O)$ -alkyl groups, $-S(=O)-NH_2$, substituted
144 and unsubstituted $-S(=O)-N(H)(alkyl)$ groups, substituted and
145 unsubstituted $-S(=O)-N(alkyl)_2$ groups, $-C(=O)-NH_2$, substituted
146 and unsubstituted $-C(=O)-N(H)(alkyl)$ groups, substituted and
147 unsubstituted $-C(=O)-N(alkyl)_2$ groups, substituted and
148 unsubstituted $-C(=O)-O$ -alkyl groups, $-NH_2$, substituted and
149 unsubstituted $-N(H)(alkyl)$ groups, substituted and unsubstituted
150 $-N(alkyl)_2$ groups, substituted and unsubstituted

151 -N(H)-C(=O)-alkyl groups, and substituted and unsubstituted
152 -N(H)-S(=O)-alkyl groups; or R⁵ may be absent if A is nitrogen;

153 R⁶ is selected from the group consisting of -H, -Cl, -F, -Br, -OH,
154 substituted and unsubstituted heterocyclyl groups, substituted
155 and unsubstituted -N(H)(alkyl) groups, substituted and
156 unsubstituted -N(H)(heterocyclyl) groups, substituted and
157 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
158 unsubstituted alkoxy groups, substituted and unsubstituted alkyl
159 groups having from 1 to 8 carbon atoms, substituted and
160 unsubstituted alkenyl groups having from 1 to 8 carbon atoms,
161 substituted and unsubstituted alkynyl groups having from 1 to 8
162 carbon atoms, -CN, -NO₂, -OH, -SH, substituted and
163 unsubstituted -S-alkyl groups, substituted and unsubstituted
164 -S(=O)₂-O-alkyl groups, substituted and unsubstituted
165 -S(=O)₂-alkyl groups, substituted and unsubstituted
166 -S(=O)₂-heterocyclyl groups, substituted and unsubstituted
167 -S(=O)-alkyl groups, substituted and unsubstituted
168 -S(=O)-heterocyclyl groups, -S(=O)-NH₂, substituted and
169 unsubstituted -S(=O)-N(H)(alkyl) groups, substituted and
170 unsubstituted -S(=O)-N(alkyl)₂ groups, -C(=O)-NH₂, substituted
171 and unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
172 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
173 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
174 -C(=O)-heterocyclyl groups, substituted and unsubstituted
175 -C(=O)-O-alkyl groups, -NH₂, substituted and unsubstituted
176 -N(alkyl)₂ groups, substituted and unsubstituted
177 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
178 -N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
179 -N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted
180 -N(alkyl)-C(=O)-heterocyclyl groups, substituted and
181 unsubstituted -N(H)-S(=O)-alkyl groups, substituted and

182 unsubstituted -N(H)-S(=O)-heterocyclyl groups, substituted and
183 unsubstituted -N(alkyl)-S(=O)-alkyl groups, and substituted and
184 unsubstituted -N(alkyl)-S(=O)-heterocyclyl groups; or R⁶ may be
185 absent if B is nitrogen;

186 R⁷ is selected from the group consisting of -H, -Cl, -F, -Br, -OH,
187 substituted and unsubstituted heterocyclyl groups, substituted
188 and unsubstituted -N(H)(alkyl) groups, substituted and
189 unsubstituted -N(H)(heterocyclyl) groups, substituted and
190 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
191 unsubstituted alkoxy groups, substituted and unsubstituted alkyl
192 groups having from 1 to 8 carbon atoms, substituted and
193 unsubstituted alkenyl groups having from 1 to 8 carbon atoms,
194 substituted and unsubstituted alkynyl groups having from 1 to 8
195 carbon atoms, -CN, -NO₂, -OH, -SH, substituted and
196 unsubstituted -S-alkyl groups, substituted and unsubstituted
197 -S(=O)₂-O-alkyl groups, substituted and unsubstituted
198 -S(=O)₂-alkyl groups, substituted and unsubstituted
199 -S(=O)₂-heterocyclyl groups, substituted and unsubstituted
200 -S(=O)-alkyl groups, substituted and unsubstituted
201 -S(=O)-heterocyclyl groups, -S(=O)-NH₂, substituted and
202 unsubstituted -S(=O)-N(H)(alkyl) groups, substituted and
203 unsubstituted -S(=O)-N(alkyl)₂ groups, -C(=O)-NH₂, substituted
204 and unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
205 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
206 unsubstituted -C(=O)-alkyl groups, substituted and unsubstituted
207 -C(=O)-heterocyclyl groups, substituted and unsubstituted
208 -C(=O)-O-alkyl groups, -NH₂, substituted and unsubstituted
209 -N(alkyl)₂ groups, substituted and unsubstituted
210 -N(H)-C(=O)-alkyl groups, substituted and unsubstituted
211 -N(H)-C(=O)-heterocyclyl groups, substituted and unsubstituted
212 -N(alkyl)-C(=O)-alkyl groups, substituted and unsubstituted

213 -N(alkyl)-C(=O)-heterocyclyl groups, substituted and
214 unsubstituted -N(H)-S(=O)-alkyl groups, substituted and
215 unsubstituted -N(H)-S(=O)-heterocyclyl groups, substituted and
216 unsubstituted -N(alkyl)-S(=O)-alkyl groups, and substituted and
217 unsubstituted -N(alkyl)-S(=O)-heterocyclyl groups; or R⁷ may be
218 absent if C is nitrogen;

219 R⁸ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
220 substituted and unsubstituted straight and branched chain alkyl
221 groups having from 1 to 8 carbon atoms, substituted and
222 unsubstituted heterocyclyl groups, substituted and unsubstituted
223 alkenyl groups having from 1 to 8 carbon atoms, substituted and
224 unsubstituted alkynyl groups having from 1 to 8 carbon atoms,
225 -CN, -NO₂, -OH, -SH, substituted and unsubstituted alkoxy
226 groups, substituted and unsubstituted -S-alkyl groups,
227 substituted and unsubstituted -S(=O)₂-O-alkyl groups,
228 substituted and unsubstituted -S(=O)₂-alkyl groups, substituted
229 and unsubstituted -S(=O)-alkyl groups, -S(=O)-NH₂, substituted
230 and unsubstituted -S(=O)-N(H)(alkyl) groups, substituted and
231 unsubstituted -S(=O)-N(alkyl)₂ groups, -C(=O)-NH₂, substituted
232 and unsubstituted -C(=O)-N(H)(alkyl) groups, substituted and
233 unsubstituted -C(=O)-N(alkyl)₂ groups, substituted and
234 unsubstituted -C(=O)-O-alkyl groups, -NH₂, substituted and
235 unsubstituted -N(H)(alkyl) groups, substituted and unsubstituted
236 -N(alkyl)₂ groups, substituted and unsubstituted
237 -N(H)-C(=O)-alkyl groups, and substituted and unsubstituted
238 -N(H)-S(=O)-alkyl groups; or R⁸ may be absent if D is nitrogen;

239 R⁹ is selected from the group consisting of substituted and
240 unsubstituted heterocyclyl groups, substituted and unsubstituted
241 aryl groups, substituted and unsubstituted alkoxy groups, -NH₂,

242 substituted and unsubstituted cycloalkyl groups, and substituted
243 and unsubstituted straight and branched chain alkyl groups
244 having from 1 to 8 carbon atoms, or R⁹ and R¹⁰ join together to
245 form a ring having 5, 6, or 7 ring members; and

246 R¹⁰ is -H, or R⁹ and R¹⁰ join together to form a ring having 5, 6,
247 or 7 ring members.

1 55. The method of claim 54, wherein the serine/threonine
2 kinase is glycogen synthase 3

1 56. The method of claim 54, wherein

2 R¹ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
3 and straight and branched chain alkyl groups having from 1 to 8
4 carbon atoms; or R¹ may be absent if W is nitrogen;

5 R² is selected from the group consisting of -H, -F, -Cl, -Br, -I,
6 -NO₂, -CN, -NH₂, -CO₂H, -OH, straight and branched chain alkyl
7 groups having from 1 to 8 carbon atoms, substituted and
8 unsubstituted cycloalkenyl groups, substituted and unsubstituted
9 cycloalkyl groups, substituted and unsubstituted alkoxy groups,
10 substituted and unsubstituted -N(H)(alkyl) groups, substituted
11 and unsubstituted -N(alkyl)₂ groups, substituted and
12 unsubstituted heterocyclyl groups, and substituted and
13 unsubstituted aryl groups; or R² may be absent if X is nitrogen;

14 R³ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
15 -OH, straight and branched chain alkyl groups having from 1 to
16 8 carbon atoms, substituted and unsubstituted alkoxy groups,
17 -CO₂H, -CN, substituted and unsubstituted -N(H)(alkyl) groups,
18 substituted and unsubstituted -N(H)(cycloalkyl) groups,

19 substituted and unsubstituted -N(alkyl)₂ groups, substituted and
20 unsubstituted heterocyclyl groups, substituted and unsubstituted
21 aryl groups, substituted and unsubstituted -C(=O)-heterocyclyl
22 groups, substituted and unsubstituted -C(=O)-alkyl groups,
23 substituted and unsubstituted -C(=O)-N(H)(alkyl) groups,
24 substituted and unsubstituted -C(=O)-N(alkyl)₂ groups,
25 -C(=O)-NH₂ groups, substituted and unsubstituted
26 -C(=O)-N(H)(heterocyclyl) groups, and substituted and
27 unsubstituted -C(=O)-N(H)(aryl) groups; or R³ may be absent if
28 Y is nitrogen;

29 R⁴ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
30 and straight and branched chain alkyl groups having from 1 to 8
31 carbon atoms; or R⁴ may be absent if Z is nitrogen;

32 R⁵ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
33 straight and branched chain alkyl groups having from 1 to 8
34 carbon atoms, and substituted and unsubstituted heterocyclyl
35 groups; or R⁵ may be absent if A is nitrogen;

36 R⁶ is selected from the group consisting of -H, -Cl, -F, -Br, -OH,
37 substituted and unsubstituted heterocyclyl groups, substituted
38 and unsubstituted -N(H)(alkyl) groups, substituted and
39 unsubstituted -N(H)(heterocyclyl) groups, substituted and
40 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
41 unsubstituted alkoxy groups, and substituted and unsubstituted
42 alkyl groups having from 1 to 8 carbon atoms; or R⁶ may be
43 absent if B is nitrogen;

44 R⁷ is selected from the group consisting of -H, -Cl, -F, -Br, -OH,
45 substituted and unsubstituted heterocyclyl groups, substituted

46 and unsubstituted -N(H)(alkyl) groups, substituted and
47 unsubstituted -N(H)(heterocyclyl) groups, substituted and
48 unsubstituted -N(alkyl)(heterocyclyl) groups, substituted and
49 unsubstituted alkoxy groups, and substituted and unsubstituted
50 alkyl groups having from 1 to 8 carbon atoms; or R⁷ may be
51 absent if C is nitrogen; and

52 R⁸ is selected from the group consisting of -H, -F, -Cl, -Br, -I,
53 straight and branched chain alkyl groups having from 1 to 8
54 carbon atoms, and substituted and unsubstituted heterocyclyl
55 groups; or R⁸ may be absent if D is nitrogen.

1 57. The method of claim 54, wherein R¹⁰ is -H and R⁹ is
2 selected from the group consisting of substituted and unsubstituted
3 heterocyclyl groups, substituted and unsubstituted aryl groups, substituted
4 and unsubstituted alkoxy groups, -NH₂, substituted and unsubstituted
5 cycloalkyl groups, and substituted and unsubstituted straight and branched
6 chain alkyl groups having from 1 to 8 carbon atoms.

1 58. The method of claim 54, wherein R¹ is selected from the
2 group consisting of -H, -F, -Cl, and -CH₃ groups.

1 59. The method of claim 54, wherein R² is selected from the
2 group consisting of -H, -Cl, -F, -Br, -I, -CH₃, -NO₂, -OMe, -CN, -CO₂H,
3 substituted and unsubstituted 1,2,3,6-tetrahydropyridine groups, substituted
4 and unsubstituted thiophene groups, substituted and unsubstituted imidazole
5 groups, substituted and unsubstituted 3-pyridyl groups, substituted and
6 unsubstituted 4-pyridyl groups, 2-substituted phenyl groups, 2,4-disubstituted
7 phenyl groups, 4-substituted phenyl groups, 3-substituted phenyl groups, 2,6-
8 disubstituted phenyl groups, phenyl, substituted and unsubstituted
9 dialkylamino groups, and substituted and unsubstituted alkylamino groups.

1 60. The method of claim 54, wherein R⁶ and R⁷ are
2 independently selected from the group consisting of -H, -F, -Cl, -OH, and
3 substituted and unsubstituted heterocyclyl groups.

1 61. The method of claim 54, wherein A, B, C, and D are all
2 carbon, and R⁴, R⁵, R⁶, R⁷, R⁸, and R¹⁰ are all -H.

1 62. The method of claim 54, wherein the IC₅₀ value of the
2 compound is less than or equal to 0.1 μM with respect to glycogen synthase
3 kinase 3.

1 63. A compound, a tautomer of the compound, a
2 pharmaceutically acceptable salt of the compound, a pharmaceutically
3 acceptable salt of the tautomer, or mixtures thereof wherein the compound is
4 selected from one of the title compounds of Examples 51-90, Examples 93-
5 100, Example 102, Example 104, Example 105, or Examples 339-1457, or
6 mixtures thereof.

1 64. A method of inhibiting a serine threonine kinase or a
2 tyrosine kinase or treating a biological condition mediated by the serine
3 threonine kinase or the tyrosine kinase, comprising administering the
4 compound of claim 63 to a subject.

1 65. The use of the compound of claim 63 in the manufacture
2 of a medicament for inhibiting inhibiting a serine threonine kinase or a tyrosine
3 kinase or treating a biological condition mediated by the serine threonine
4 kinase or the tyrosine kinase.

1 66. The compound of claim 63, wherein the compound is
2 selected from those listed in Table 3, those listed in Table 4, or those listed in
3 Table 5.

1 67. A method of inhibiting a serine/threonine kinase in a
2 subject or treating a biological condition mediated by the serine/threonine
3 kinase in the subject, comprising: administering to the subject a compound, a
4 tautomer of the compound, a pharmaceutically acceptable salt of the
5 compound, a pharmaceutically acceptable salt of the tautomer, an enantiomer
6 or diastereomer of the compound, an enantiomer or diastereomer of the
7 tautomer of the compound, a pharmaceutically acceptable salt of the
8 enantiomer or diastereomer, a pharmaceutically acceptable salt of the
9 enantiomer or diastereomer of the tautomer, or mixtures thereof wherein the
10 compound is selected from one of the title compounds of Examples 51-90,
11 Examples 93-100, Example 102, Example 104, Example 105, Examples 339-
12 1457, or mixtures thereof.

 68. The compound of claim 67, wherein the compound is
 selected from those listed in Table 3, those listed in Table 4, or those listed in
 Table 5.